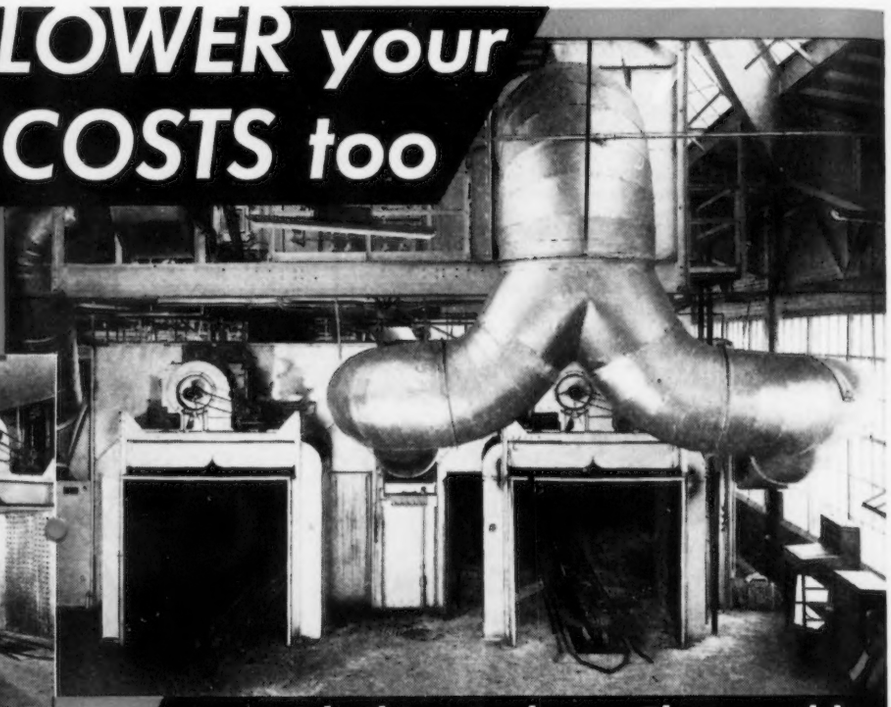
THE IRON AGE

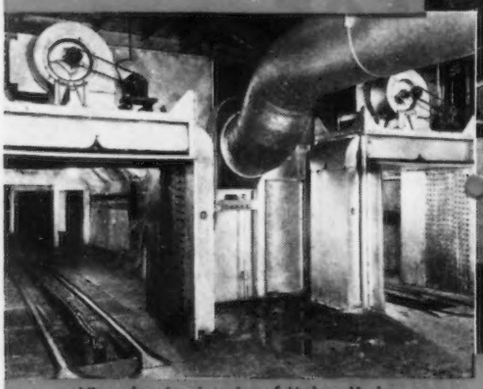
Contents

May 2, 1940

YOU can LOWER your Finishing COSTS too

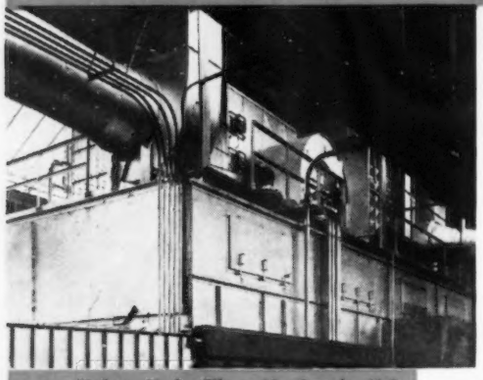


At the right: Mahon Finishing Equipment installed on two production lines for finishing automobile bodies in a large automobile plant.

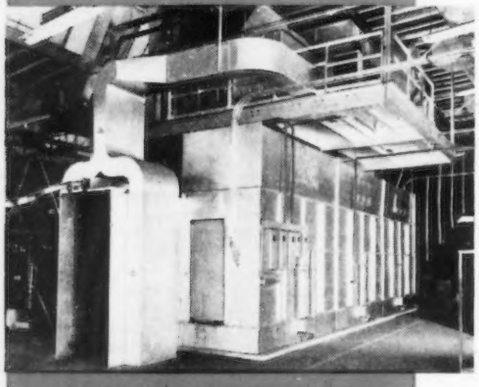


View showing interior of Mahon Hydro-Filter Spray Booths and provisions for air curtain at entrance of each production line.

. . . with this Modern, Thoroughly Engineered, Properly Coordinated FINISHING EQUIPMENT



Mahon Hydro-Filter Air Supply Unit which supplies clean, filtered air to the Mahon Finishing System in a large automobile plant.



Mahon Hydro-Filter Spray Booth designed especially for handling Hoods and Fenders in the finishing system of a large automobile plant.

Finishing costs are not only a problem in the automotive field, but in every industry where finish requirements constitute a major production operation. Finishing Systems, including Cleaning, Rust Proofing, Drying, Spraying and Baking Equipment, to function efficiently and economically, must be thoroughly engineered around the products to be handled, and, the entire system must be perfectly balanced and coordinated throughout to produce the desired results in continuous operation . . . that is why manufacturers by the hundreds are today turning their entire finishing problem over to Mahon—they know that, through constant research and development and the widely diversified experience of Mahon engineers in this field, the Mahon organization is better fitted to produce the type of Finishing System any manufacturer has the right to expect . . . a Finishing System which assures maximum efficiency plus maximum economy. If you are contemplating the purchase of a Complete Finishing System, or any unit thereof, it will pay you to call in a Mahon engineer now—consultation will not place you under any obligation.

THE R. C. MAHON COMPANY

DETROIT — — CHICAGO

Designers and Manufacturers of Complete Finishing Systems, Metal Cleaning Machines, Rust Proofing Machines, Hydro-Filter Spray Booths, Ovens of All Types, Filtered Air Supply Units, Hydro-Foam Dust Collectors and many other Units of Special Production Equipment.

MAHON

▲▲▲ THE IRON AGE ▲▲▲

MAY 2, 1940

ESTABLISHED 1855 Vol. 145, No. 18

SELLING AMERICA SHORT

BY and large, you people whose business is to direct and make sales in and to the capital goods industries of America are only doing a 50 per cent sales job.

This is indisputably proved by the accumulation of more than $17 billion of "oversavings" in our country during the past 10 years. And doubly proved by a deficit in capital investment for plant, equipment and inventory, during the same period, of over twice that amount.

Most business men explain that the reason for this huge deficit in demand and this great pile of unused purchasing power is "timid money." That the Government, or rather the pink part of it, has scared money so stiff that it has stopped flowing.

Doubtless the New Deal has created some of the greatest sales obstacles to a willingness, private or corporate, to risk money. But sales resistance is made to be overcome by enterprise, initiative and energy.

So passing the buck to Uncle Sam does not fry us any bacon. No one has got or will get further than the WPA by depending on Uncle Sam or Aunt Fanny.

We must give the Administration credit for trying. It has tried to dynamite this log jam of oversavings by all sorts of regulatory and punitive legislation. But idle money cannot be forced out of hiding and put to work, here in the United States, as it has been in Russia and Germany. In an individualistic economy of free men and women, savings must be coaxed out of hiding and made to want to go to work to earn some money.

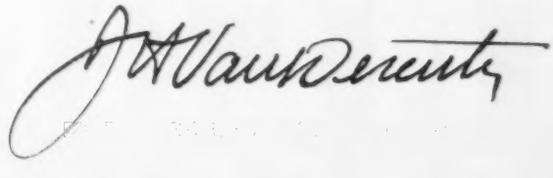
Don't forget that American dollars, not foreign dollars, are going to finance American production and consumption after this war is over. Nor that the large percentage of foreign orders now on your books represents buying rather than selling.

The end of this war and the drying up of equipment orders from abroad that will follow it will leave a considerable vacuum in many American plants for years to come unless they are filled with domestic business.

We must develop a capacity for super-salesmanship that will dynamite the log jam of domestic orders and investment and send the logs downstream to the sawmill. And now is none too soon to begin.

We have been selling America short. Short to the tune of 34 billions of capital equipment during the past decade. But fortunately we have the purchasing power or investing power at hand to at least make up half the shortage.

Get your merchandising people busy right now preparing plans to tap your share of the $17 billion that is marking time and waiting the marching orders of super-salesmanship.



"It's because we are turning out more parts, at lower cost," says this operating manager, "but that is only part of the story. Inland Quality Sheets and Inland Co-operation help us give our customers finer products and better service."

Inland quality is based on using only the best of controlled raw materials. Inland Steel is processed on the most modern continuous mills, by men who are masters of steel making. Backing this strong combination is an expert staff of metallurgists that co-operates with customers, works with the mill men, and carries on endless research.

Inland customer co-operation goes far beyond the routine. It includes catching on to the spirit of things, being able in many intangible ways to help each user do his job better, easier and more economically. It includes thoughtful anticipation of demands, and constructive help on all problems from early design stage through production of finished parts. All these play a role in the established preference for Inland Sheets. You, too, can gain by using Inland Sheets and Inland Service.

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Modern Analysis IN THE FOUNDRY...

By GEORGE W. ZABEL
Foundry Superintendent, Fa'rbanks, Morse & Co.,
and
JOHN SCHUCH
Spectroscopist, Harry W. Dietert Co.

COMBUSTION-TYPE carbon and sulphur determinators, and spectroscope equipment in Fairbanks, Morse & Co. foundry analyze plain and alloy cast iron, semi-steel, aluminum, manganese bronze and brass, with precision, despatch and economy.

THE large variety of products manufactured by Fairbanks, Morse & Co., range from Diesel engines, stationary and mobile from 5 hp. to 2000 hp., motors and generators, gasoline engines, pumping equipment, magnetos and stokers, etc. Therefore, the foundry laboratory must be capable of precise analysis of plain and alloy cast iron, semi-steel, aluminum, manganese bronze and brass with the utmost despatch and economy.

With this end in view, a completely new laboratory was built at the foundry of the Beloit, Wis., plant of Fairbanks, Morse & Co. The laboratory is air conditioned with a Fairbanks, Morse air conditioning unit, and is equipped with modern analysis equipment, consisting of a spectrographic unit, carbon determinator and sulphur determinator, installed by the Harry W. Dietert Co., Detroit.

The personnel of the laboratory ordinarily consists of three men. One of these is a regular foundry apprentice, who, after serving three months, is regularly replaced by another apprentice. His duties involve periodic testing of molding sands, the mechanical sand handling equipment, and core sand mixtures. His activities are under the direction of the laboratory head, who besides conducting the spectrographic analysis also supervises the research work that is being carried on almost continually by the sand tester. The third operator manipulates the carbon and sulphur determinators on incoming samples and assists the spectroscopist in the final stages of the spectrographic analyses.

The procedure involved in the analysis of cast metals starts at the cupolas or electric furnace with the pouring of the chilled test specimens in a specimen mold, Fig. 1. The mold consists of a pouring basin and four holes ⅛ in. in diameter by approximately 1 in. deep. As soon as the specimens are poured, the specimen castings are rushed to the laboratory where three of the ⅛-in. diameter pins are broken off. The ends of two of the specimens are ground smooth on a grinding wheel provided for that purpose. These specimens are subsequently mounted in the arc-spark stand of the spectrograph and are analyzed.

The third pin is used to provide ¼-gm. and 1-gm. samples for the carbon and sulphur determinators respectively. Samples of this size are secured by inserting one of the chilled cast pins

into a hole contained in a hardened steel block. For a ¼-gm. sample the pins are inserted to a depth of approximately ¼ in. and for a 1-gm. sample, to a depth of about ½ in. The part of the specimen that protrudes above the hardened block is broken off with a sharp blow. The remaining sample is removed from the hole, weighed, placed in a combustion boat and burned in either the carbon or sulphur determinator in the usual manner. No effort is made to obtain a sample of exactly ¼ or 1 gm. Instead, the final analysis is computed according to the actual weight of the sample. Usually samples secured in this manner are correct to within 5 per cent of the desired weight. This method of sampling was developed in the Fairbanks, Morse laboratory and it has permitted a considerable saving in time over that required where larger samples had to be cooled and drilled in order to obtain suitable samples. This procedure is particularly advantageous where annealing of the specimen would normally be required prior to drilling.

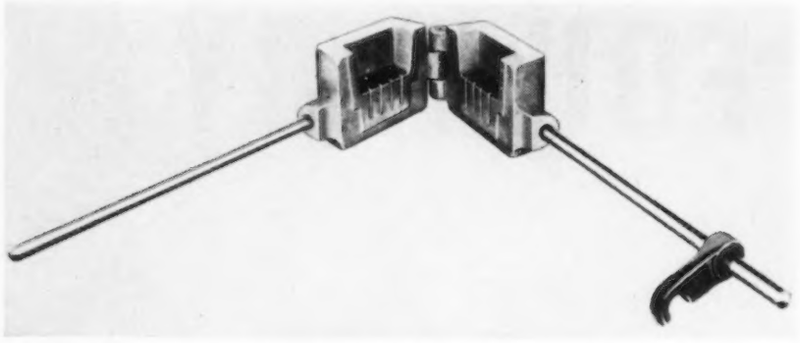


FIG. 1—Specimen mold used to cast the test specimen for carbon, sulphur and spectro-chemical determinations.

C and S Determinators

Both the carbon and the sulphur determinators, illustrated in Fig. 2, are of the combustion method type. In the case of the carbon determinator, a weighed sample is burned in the combustion furnace at 2100 deg. F. By adding a small fraction of a gram of 20-mesh metallic tin as a catalyst, complete combustion will occur in from 5 to 10 sec. The products of combustion leave the furnace and pass through a sulphur trap to remove SO_2 and the remaining gases are collected in the central water jacketed burette. When all of the products of combustion have been collected in the burette, the gases are bubbled through a concentrated potassium hydroxide solution in the right hand absorption bulb. Here the potassium hydroxide absorbs the carbon dioxide in one passage of the gases. By lowering the aspirator bottle, the remaining gases are brought back into the original burette and the decrease in the volume of gas, due to the loss of CO_2 in the caustic, is read off the graduated scale engraved on the lower end of the burette. While this scale is graduated directly in percentage of carbon, it is usually necessary to correct for temperature and atmospheric pressure. A barometer serves to give the pressure, and the temperature of the gas is given by a thermometer within the burette. Applying this data to a chart supplied with the instrument, a temperature-pressure factor is obtained which, when multiplied with the burette reading, gives the correct percentage of carbon in the sample. The time required for the test, including the weighing of the sample, does not exceed 3 min. The accuracy attained is well within ±0.02 per cent for samples where the concentration of the carbon is 1.50 and 6.0 per cent. For steels, the accuracy is about ±0.005 per cent of carbon.

While the control of sulphur has not been accorded the importance common to other elements, a combustion sulphur determinator is used for this element since it is the desire of the management to keep abreast with the best in iron control. The sulphur determinator, Fig. 2, works in a fashion similar to the carbon determinator.

The ¼-in.-long test specimen is weighed and is placed in a combustion boat and is then burned with 20-mesh tin at 2100 deg. F. The products of combustion pass to the titration vessel of the sulphur absorption solution consisting of hydrogen peroxide and sodium hydroxide. The sulphur dioxide gas reacts with the H_2O_2 and forms sulphuric acid. The acid thus formed is in turn neutralized by the standardized sodium hydroxide solution. After the sample has burned completely, and all of the products of combustion have been swept through the absorption solution in the titration vessel, the stream of oxygen is turned off and the excess sodium hydroxide is titrated with standardized sulphuric acid solution contained in the central burette. The strength of the various solutions are arranged so that the amount of sulphuric acid required to neutralize the excess sodium hydroxide is a direct measure of the amount of sulphur in the sample. Thus, the sulphuric acid burette is graduated directly in percentage of sulphur and no correction factor is required.

To prepare the apparatus for the next test, the sample is removed from the furnace and the titration vessel is drained through a stopcock located at its lower end. The vessel is rinsed with distilled water released through a pipette provided. The required amounts of hydrogen peroxide and standardized sodium hydroxide are added by means of automatic pipettes and the apparatus is ready for the next test.

The time required for the test is approximately five minutes. The accuracy of the test, for plain or alloyed irons, including molybdenum alloy irons, is about 0.001 or 0.002 per cent of sulphur.

Spectrographic Analysis

While one operator is engaged in determining the carbon and sulphur content of the sample, the third operator proceeds to analyze the specimen for silicon, manganese, nickel, chromium and molybdenum on the spectrograph, Fig. 3. After the ends of two of the chilled cast pins from the test specimen have been ground clean and smooth, they are mounted in the arc-spark stand of the spectograph. Here they are subjected to a 35,000-volt condensed spark. As a result of the electrical bombardment, the samples emit atoms into the space between the electrodes where they are excited sufficiently by virtue of the electrical disturbance to cause them to give off light. The light that is emitted from the samples passes into the spectrograph through a suitable slit and falls upon a grating which diffracts or separates the light into its component wave lengths. The grating, being of the concave reflecting type, re-focuses the spectrum, without the aid of lenses, onto the photographic film within the camera which serves to reg-

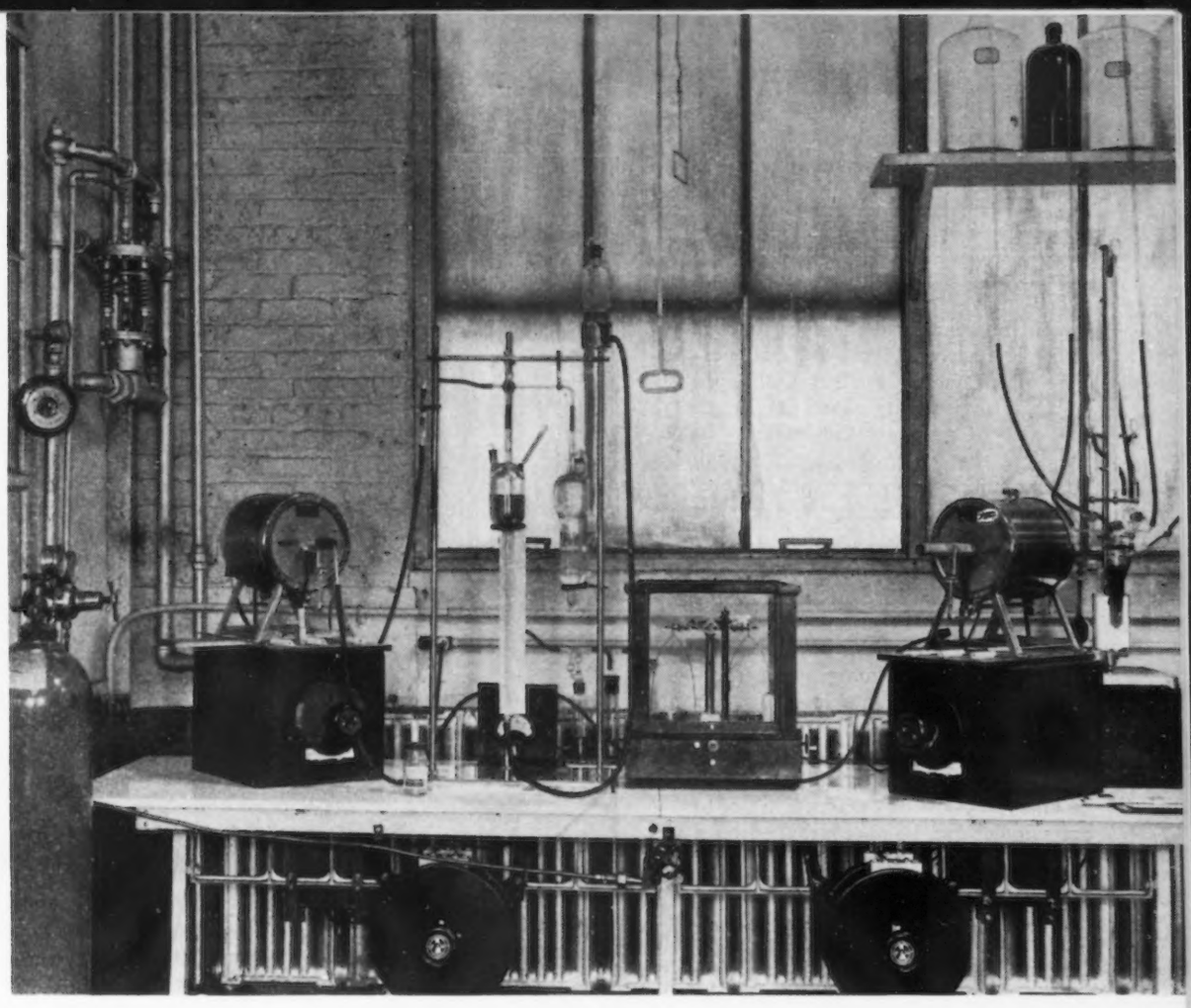


FIG. 2—Set-up for carbon and sulphur determinations. The carbon determinator is shown on left side and the sulphur determinator on the right-hand side.

FIG. 3—Spectrograph with d.c. arc unit and a.c. spark unit.

ister the spectrum for subsequent examination.

To insure representative sampling of specimens, the duration of the exposure is artificially lengthened by using a 270-mesh screen which is located between the spark and the spectrograph slit. The screen serves the dual purpose of providing the slit with light of uniform intensity along its length and also of reducing the intensity of the light that enters the spectrograph so that sufficiently long exposures, resulting in better sampling, are possible without the attendant danger of overexposure of the film.

After an exposure of 1 min., the spark is shut off by means of an automatic timer. The camera is racked up the width of the photographed spectrum, thus bringing into focus another unexposed portion of the film so that the instrument is ready to record the spectrum of the next sample that is to be analyzed. In this way, from six to ten samples can be photographed on a single strip of 35 mm. motion picture film.

When the desired number of samples have been sparked, the exposed film is withdrawn through a lightproof aperture of the camera and cut off and developed. Incidentally, the camera is loaded with a 100-ft. roll of film. Since the film is threaded over sprockets, the removal of an exposed portion always leaves the camera loaded with a fresh strip of film ready to photograph new samples.

Secondary only to the importance of absolutely uniform sparking of all samples is the uniform development of the spectrograms. In the first instance, variations in the character of the spark from sample to sample is apt to lead to important errors—because varying the electrical conditions will cause a corresponding variation in the intensity of the spectral lines emitted. However, proper and uniform sparking can be assured through the use of well designed and "tuned" spark generating apparatus built for the purpose. Likewise, variation in development, or improper development, is also likely to lead to errors because the developed image will not indicate the true intensity of the light that fell upon the emulsion of the film. And, while this source of error is normally corrected for by actually finding the relationship between the intensity of the incident light and the blackening of the photographic image by means of the customary characteristic curve of the emulsion, it is best to avoid the necessity for this step by close control of the development afforded by mechanical developing machines, since attempts to apply correction factors for gross errors in development are both laborious and time consuming.

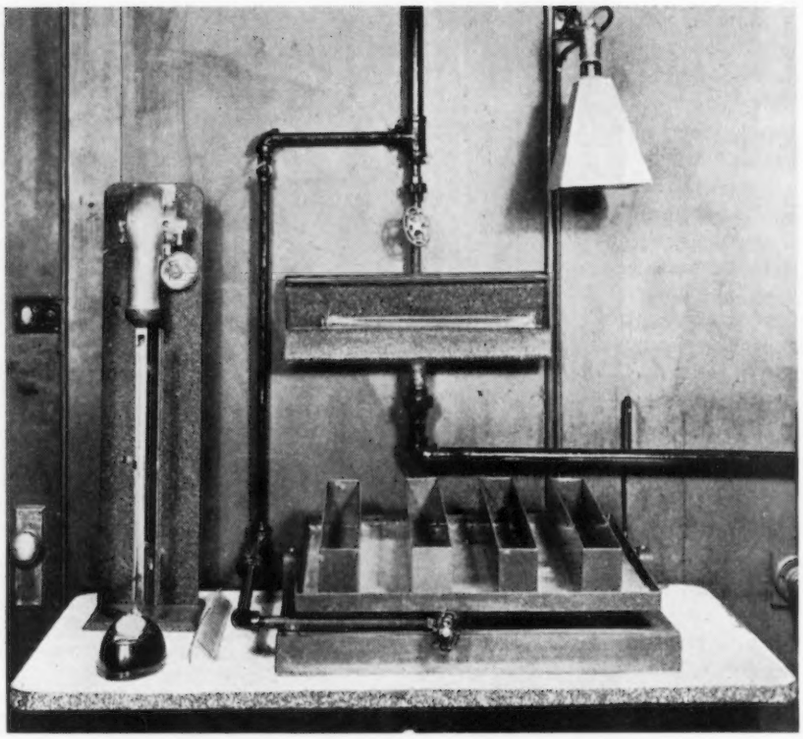


FIG. 4—A view of the dark room, showing, from left to right, the film dryer, developing machine, and washing rack on the wall.

The actual development of the spectrograms are carried out in the developing machine located on the table in Fig. 4. This machine assures uniform development by mechanically agitating the solutions. The solutions are kept at a uniform temperature by circulating water coils. The processing solutions are prepared according to standard formulas, slightly modified for more speedy development. The time of development is controlled by a stop watch. By this means, complete development, hardening and fixing of the film is accomplished in 2 min. In another 2 min. the spectrogram is washed in a washing rack, shown on the wall in Fig. 4, and dried in the dryer shown on the left hand side in Fig. 4.

The spectrogram is now ready for the projection comparator-densitometer machine, Fig. 5, which is used to identify the spectral lines that appear on the spectrogram and also to measure the density or blackness of the lines for quantitative determinations.

Spectral lines are identified with the aid of the master plate, the image of which covers the lower third portion of the screen in Fig. 5. The master plate, which is an integral part of the projection comparator, contains three necessary sets of data. Running horizontally through the center of the master image is an iron spectrum. This spectrum serves as a means of bringing the sample spectrum into strict alinement with the master. This is accomplished by mounting the sample spectrogram into its holder so that the iron lines that it contains are directly above the corresponding iron lines in the master. The second set of information consists of the longer vertical lines which extend from the top of the iron spectrum to the top of the master image (which extend up to the horizontal line drawn on the screen). These lines designate the positions in relation to the iron spectrum of the most sensitive lines of the 70 elements that are most readily detected by spectrographic means. Each is labeled with the correct chemical symbol below the iron spectrum. Finally, the master also contains a wave-length scale. The incorporation of a wave-length scale is easily possible when a grating spectrograph is used, for a diffraction grating produces spectra of uniform dispersion at all wave-lengths. There is a simple linear relationship between the wave length of any line and its location on the film. The scale used to measure wave-lengths consists of the shorter lines that appear at the top of the master. These lines are 10 Angstrom units apart, and are labeled with the corre-

sponding wave-lengths at the bottom of the master. In addition, a scale equal in length to the distance between the 10 Angstrom lines is inscribed on the horizontal line at the center of the screen. This scale is 10 Angstroms long and is subdivided into 0.2 Angstrom divisions and is used to identify various lines that are not labeled.

By racking the carriage of the projector which holds the master and the sample spectrograms so that one of the Angstrom-unit scale lines is at the zero point, the operator is able to read the wave-length of any unknown spectral line of interest to an accuracy of 0.1 or 0.2 Angstrom units. Having thus found the wave-length, it is an easy matter to determine what element gave rise to that line by simply consulting a wave-length table or handbook.

The sample spectrogram is placed into its holder and alined with the master by means of a vernier screw adjustment. The instrument projects both images, the unknown spectrogram above the horizontal line of the screen and the master spectrogram below this line. As the two images are moved along horizontally across the screen simultaneously by means of a rack and gear, the operator simply notes coincidences between the sample spectral lines and the labeled element lines on the master in order to determine whether or not that element is present or absent in the sample under investigation. Thus, magnesium lines are indicated in the spectra of the samples that appear above the master on the screen in Fig. 5.

Quantitative analysis is based on the fundamental concept that the more of an element present in a sample, the more intense will be the light given off by that element. For, obviously, there will be a greater proportion or number of atoms of that substance in the spark gap. Thus, the spectrum of an alloy high in nickel content will have much darker nickel lines than one containing a smaller amount of that element. Therefore, quantitative analysis resolves itself into correlating the degree of blackness or density of the photographed spectral line (intensity of the light emitted by that element) with the concentration of that element in the specimen. This is accomplished with the aid of a densitometer which appears on the left-hand side of the projection-comparator in Fig. 5.

The densitometer consists essentially of a synchronous motor-driven scanning slit and photo-tube mounted within the projector head. When a control button is pressed, the slit sweeps across the selected spectral line, which has been identified on the screen, in an exactly reproducible manner. The light that passes through the spectral line and enters the scanning slit as it moves across the line falls upon a photo-tube which, in turn, actuates a micro-ammeter through a suitable amplifying system. For reasons of convenience, the meter is graduated so that it actually reads the light transmission through the lines directly. In this manner the light transmission of two lines are read for each element that is to be determined. The one line that is measured is that of the element in question and the other is of one arising from the matrix of the alloy which, for instance, is iron, when ferroalloys are being analyzed, and aluminum, in the case of aluminum castings.

The ratio of the transmission of the elemental line to the transmission of the major constituent line is applied to a transmission ratio-concentration curve that has been previously constructed from data obtained by the analysis of samples of known concentration. To eliminate the possibilities of mathematical errors and in the interest of speed, the transmission ratio, the relationship between spectral line transmission and intensity of the light that produced that density and concentration, is obtained mechanically with the aid of a calculating board, Fig. 6. The concentration thus obtained is read from the horizontal log scale of the board, Fig. 6.

Silicon, manganese, nickel chromium and molybdenum content of ferrous metals are determined with the spectrographic equipment. It is believed that this equipment will analyze cast irons falling within the following range:

	Per Cent
C	0.00-6.00
S	0.00-0.39
Si	1.25-3.50
Mn	0.30-1.30
Ni	0.10-1.50
Cr	0.15-3.00
Mo	0.10-1.20

Cast irons are being analyzed many times daily in the following range:

	Per Cent
C	0.00-3.75
S	0.00-1.50
Si	1.50-3.00
Mn	0.50-1.25
Ni	0.15-1.50
Cr	0.20-1.00
Mo	0.10-0.80

The complete analysis of a sample for these elements is obtained in 12 min. with the described apparatus. One man operates the spectrograph except during the final stages. When the operator of the carbon and sulphur determinators has finished his task, he steps into the spectrographic room and assists the spectroscopist by manipu-

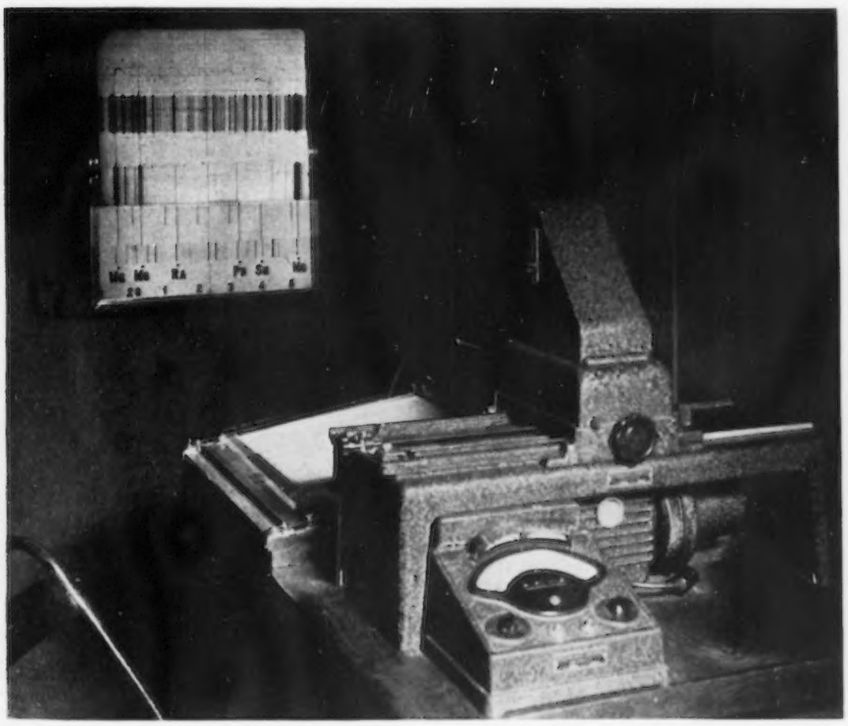


FIG. 5—Projector-densitometer unit with screen, showing projection of a portion of a spectrogram.

lating the calculating board as the spectroscopist reads the spectral line transmission from the densitometer. The accuracies consistently obtained are of the order of ± 1 to 3 per cent of the total amount of the alloy present. The spectrographic analysis has proved to be accurate and reliable.

Several months ago, an effort was made to determine the comparative accuracy of chemical and spectrographic analyses. Seven samples were poured at the same time from one heat. The samples had, therefore, practically the same composition. To determine the correct composition they were analyzed by three independent chemical laboratories. To assure a fair test, the laboratories were not informed that the samples were practically identical. The results of this series of analyses are given in Table I.

While the values reported by the chemical laboratories may be the aver-

TABLE I

Comparison Between Analysis Reported by Chemical Laboratories and Spectrographic Laboratory.

Sample No.	Laboratory	Elements, Per Cent Composition				
		Si	Mn	Ni	Cr	Mo
1	Laboratory A	1.92	0.97	1.32	0.72	0.61
	Laboratory B	1.90	1.01	1.39	0.73	....
	Laboratory C	2.01	0.96	1.40	0.74	0.57
	Chemical Analysis Average	1.94	0.98	1.37	0.73	0.59
	Spectrographic Analysis	1.91	0.98	1.46	0.74	0.61
2	Laboratory A	1.95	0.96	1.30	0.75	0.60
	Laboratory B	1.92	0.98	1.38	0.74	....
	Laboratory C	2.05	1.01	1.40	0.76	0.58
	Chemical Analysis Average	1.97	0.98	1.36	0.75	0.59
	Spectrographic Analysis	1.93	0.98	1.36	0.72	0.56
3	Laboratory A	1.94	0.92	1.34	0.74	0.59
	Laboratory B	1.93	0.97	1.38	0.76	....
	Laboratory C	2.05	0.98	1.40	0.75	0.58
	Chemical Analysis Average	1.97	0.96	1.37	0.75	0.585
	Spectrographic Analysis	1.95	0.95	1.43	0.72	0.60
4	Laboratory A	1.96	0.94	1.29	0.74	0.60
	Laboratory B	1.95	0.96	1.34	0.73	....
	Laboratory C	2.08	0.99	1.39	0.77	0.58
	Chemical Analysis Average	2.00	0.96	1.34	0.75	0.59
	Spectrographic Analysis	2.03	0.96	1.36	0.76	0.59
5	Laboratory A	1.95	0.95	1.29	0.74	0.56
	Laboratory B	1.96	0.98	1.36	0.74	....
	Laboratory C	2.08	0.96	1.39	0.76	0.60
	Chemical Analysis Average	2.00	0.96	1.35	0.75	0.58
	Spectrographic Analysis	1.98	0.99	1.43	0.73	0.60
6	Laboratory A	2.00	0.96	1.30	0.74	0.61
	Laboratory B	1.97	0.96	1.38	0.74	....
	Laboratory C	2.02	0.97	1.39	0.76	0.59
	Chemical Analysis Average	2.00	0.96	1.36	0.75	0.60
	Spectrographic Analysis	2.02	0.98	1.39	0.76	0.60
7	Laboratory A	2.00	0.93	1.29	0.72	0.59
	Laboratory B	1.98	0.95	1.39	0.73	....
	Laboratory C	2.01	0.95	1.38	0.76	0.58
	Chemical Analysis Average	2.00	0.94	1.35	0.74	0.585
	Spectrographic Analysis	1.97	0.95	1.36	0.76	0.59
Average Difference Between Chemical Analysis and Spectrographic Analysis, Per cent		1.50	1.00	3.00	2.50	2.40

age of a number of individual analyses, the values reported for the spectrographic analyses are the results of individual tests and are not average figures derived from duplicate runs.

It may be noted that the average deviation of the spectral-chemical analysis from the average chemical analysis is in all cases ± 3 per cent or less of the amount of element present in the sample. When the average of the chemical analysis is compared with the analysis reported by the spectrographic laboratory, it may be noted in Table I that an exceedingly close agreement exists. The average difference does not exceed 3 per cent of the element concentration. In the case of silicon there is a 1.5 per cent average difference and 1.0 per cent average difference for manganese.

The spectrographic equipment is used to analyze all ferrous alloys and non-ferrous alloys such as manganese bronze and aluminum alloys. The procedure for the tests for non-ferrous alloys is basically the same as that employed for ferrous metals. The concentration range of the elements controlled in aluminum castings has been confined to the copper content only on which castings are accepted or rejected. The maximum copper content allowable being 0.10 per cent. No difficulty is found in checking copper in aluminum from 0.017 to 0.26 per cent.

In the analysis of zinc die castings, the standard A.S.T.M. method, using standard solutions, is employed. According to this procedure, the samples are dissolved in a 50-50 mixture of concentrated hydrochloric and nitric acid, and the solution is made up to a strength of 0.333 gm. of zinc die casting per cubic centimeter. One-tenth cubic centimeter of solution is pipetted into a crater formed in the end of a ¼-in. diameter graphite electrode and dried. In like manner, other electrodes are charged with standard solutions. These solutions are made up synthetically in a graded series of analyses. When the charged electrodes have dried, they are burned in a 250-volt, d.c. arc and their spectra photographed. The current for the d.c. arc is supplied by the vacuum tube rectifier shown in the left foreground of Fig. 3.

After the spectrogram has been developed, it is placed in the projection-comparator, Fig. 5, and examined on the screen. By visually comparing the density or blackness of the sample spectral lines with those in the standard samples, the analysis of the unknowns is effected. The accuracy attained by this simple procedure is usually ±0.001 per cent for lead, tin and cadmium. For the other elements that are present in somewhat higher concentrations, the inaccuracy is greater in proportion to the concentration.

The installation of modern analysis equipment has enabled the Fairbanks, Morse & Co. foundries to produce castings more closely in conformity with the desired analysis than had been previously attainable. Not only has it been the means of effecting economies by eliminating losses formerly encountered due to the pouring of castings of improper analysis, which had to be scrapped, sometimes after they have been machined, but it has also enabled the management to revamp the melting and molding procedure of the foundry. Formerly, the cupolas had to be started earlier in the day solely for the purpose of providing metal to pour off molds on the conveyor system. Inasmuch as the metal requirements for this purpose were small, the cupolas had to be run at only a fraction of their capacity.

A two-ton electric furnace has been installed to furnish the metal formerly supplied by the cupolas for early-in-the-day pouring. The use of the spectrographic equipment has also permitted the charge of the electric furnace to consist almost entirely of borings. Because of the rapid analysis afforded by the spectrograph, the necessary alloy additions can be determined and added to the bath by the time the heat is to be tapped.

The cost of the installation proved to be no greater than that required to install an ordinary "wet" chemical laboratory equipped to perform equivalent analysis. The cost of operating and maintaining the spectrographic laboratory is less than the cost of operating and maintaining the chemical laboratory. Only two operators are required for the determination of carbon, sulphur, silicon, manganese, nickel, chromium and molybdenum, while three or four chemists would be needed if chemical methods were used.

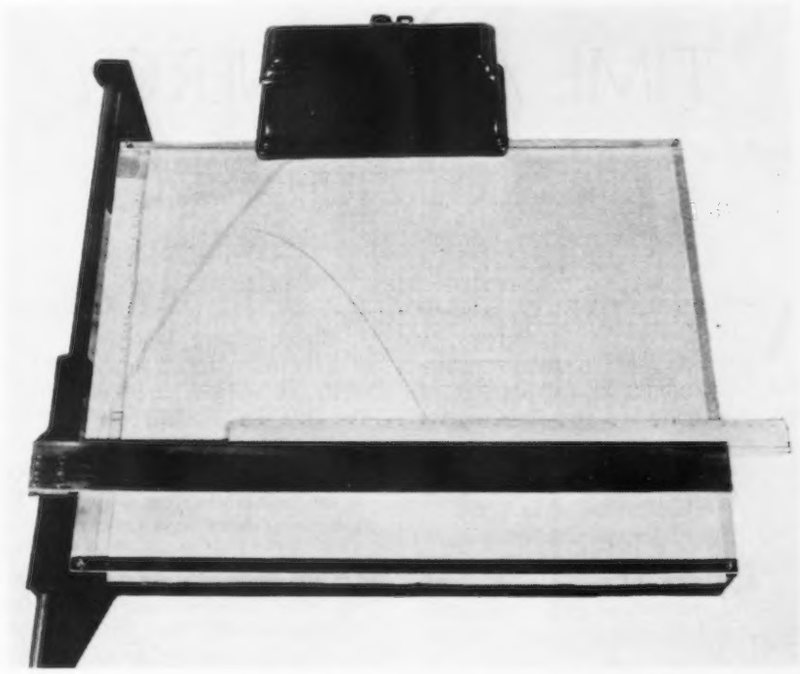


FIG. 6—Calculating board used for determining the actual percentage of element present from density of spectral line.

Assuming that six samples are run at a time on one strip of film, the operating cost of the spectrograph is about 1c. per sample for film. Electrical current and developing solutions amount to an additional fraction of a cent. In regard to the sulphur and carbon determinations, the material cost is less than 2c. per determination. The combustion boats, which cost 3c. each, are used for several determinations. Other charges are substantially less than a cent. Labor cost for a complete analysis for all seven elements of six samples (42 analyses) based on a test of 12 min. elapsed time is approximately 0.6 man-minutes per element determined and the material cost per element is less than 1c.

PROPER QUENCH TANKS SAVE TIME AND ENERGY

A COMPARATIVELY modest investment is sufficient to provide good quenching equipment. Depending on the amount of work to be quenched, there are several designs which will provide convenience, and help reduce costs well below the burden which old equipment imposes.

In small tool and die shops where not a great deal of work is hardened, a simple, compact quench tank providing for both water and oil quenching, can be made up for a matter of $10 or $15, or even less, according to the Lindberg Engineering Co., Chicago. One design which has been used in the Lindberg laboratory consists of a 1/16 in. rolled and welded steel shell. A welded partition across the diameter enables half the tank to be used for oil and half for water quenching. The general design is indicated in the accompanying diagram. Suitable wire mesh baskets can be made to fit each half section of the tank, and are suspended by small clips fitting over the top edge of the tank. Needless to say the tank should be tested to be certain that oil and water do not mix.

For heavier service such as is the case in a production heat treating department, quench tanks must, of course, be provided with circulation and cooling. The actual quench tank itself can be designed to remove a lot of troublesome labor from the operator and at the same time eliminate overhead lifting tackle and provide for quick drain and cleaning.

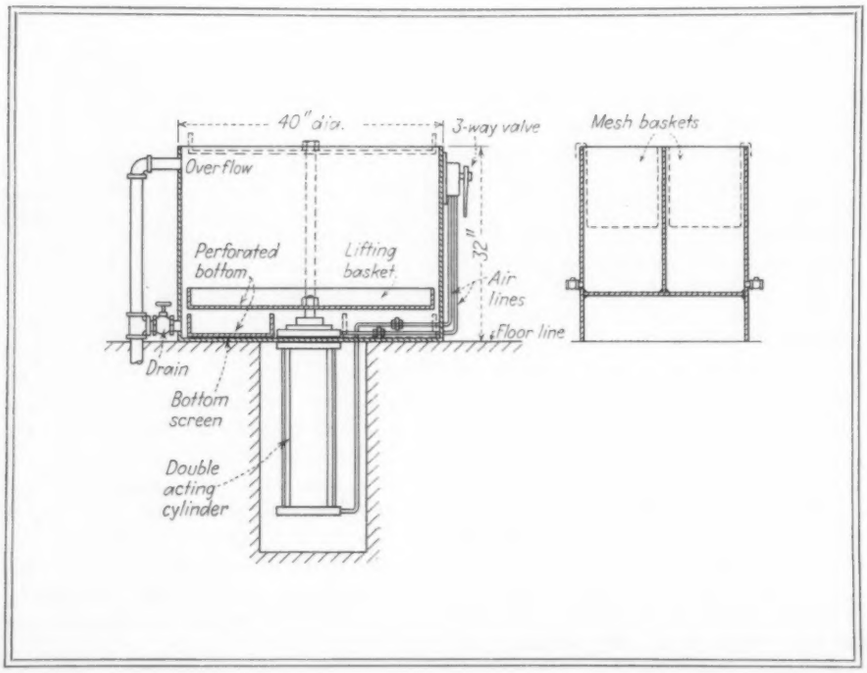
In the Lindberg plant a design has been worked out which has proved most satisfactory from a production standpoint. As shown in the accompanying illustration, it consists of a cylindrical tank provided with a perforated basket which is raised and lowered by means of an air cylinder underneath the tank. In addition there is a perforated screen which rests on the bottom of the tank and serves to retain foreign matter, such as scale or cyanide which might otherwise get into the circulating system.

The basket is controlled by a 3-way air valve and can be raised or lowered quickly, or slowly, and can be stopped at any level. Work that is too heavy to be agitated manually can be allowed to rest in the basket while it is being alternately raised and lowered in the oil or water to produce maximum cooling effect. When the work has cooled sufficiently, the operator raises the basket above the level of the quenching medium and before removing allows the work to drain.

Where draining and cleaning of quench tanks used to be a dirty, disagreeable job requiring at least an hour, this tank can be drained, cleaned, and put back into service in about 10 min. To do so, the drain valve is opened and the basket is raised and removed by taking off the one nut that holds it to the air cylinder shaft. The perforated screen in the bottom of the tank is then pulled up and the scale and other material which has collected on the screen is brushed off. The parts are replaced as quickly as they were removed, and the tank is put back into operation.

In addition to catching the scale and other matter, the screen in the bottom also serves to retain any small parts which might drop through the small space between the basket and the inside wall of the quench tank. Also, this design requires no chain hoists and overhead tackle.

The air operated quench tank described above can be built for about $200 to $225 and is an investment that pays itself back in a few months' time on the basis of convenience, and saving of time.



Hardenability and Quenching

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and
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IDENTICAL steel hardened in two different mills often shows considerable variation in depth of hardening. Thus, in many cases it is useful, possibly even imperative, to ascertain severity of quench quantitatively, and an easy method for doing this is described in this article, as well as a method for referring hardenability results to a single standard quench. In the first section, last week, the authors presented hardenability and quenching charts and explained their use. Herein, in conclusion, detailed data are given on the basis for the charts, as well as the origin and significance of the term Du/D, and various severities of quench encountered in practice as evaluated by this method.

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The Basis for the Charts

WHEN a bar of steel is quenched in order to harden it, it is generally found that the inner portion of the bar is less fully hardened than the outside. The extent of hardening across the cross-section is determined by making a series of hardness measurements, and is generally summarized in a "hardness traverse curve," of the type shown (last week) in Fig. 1, the familiar "U-curves."

Now it is clear that the lesser hardening of the interior is due to the slower cooling there (in quenching), as compared with the outside of the bar. In discussing the present scheme for measuring the severity of quench, it turns out to be easier to speak first of the cooling-time at different positions in the bars, and only later to return to consideration of the hardness which resulted from the cooling-time.

When a bar is quenched, the cooling-time at the outside of the piece is relatively short, with progressively longer cooling-times toward the center. *These different cooling-times,* at different positions in a bar, form the basis of the present discussion. Consider for example a 1-in. round bar quenched in water, using fair agitation. The cooling-time at the center of the bar has been found by experiment to be about 11 sec. (The "cooling-time" is the half-temperature cooling-time as explained elsewhere.) Compare this 1-in. bar with a 1½-in. bar; in the latter it has been found by experiment that the cooling-time at the center is about 24 sec. Within the 1½-in. bar, however, the cooling-time is of course less as one proceeds from center to surface, and it has been found by experiment that at a position 0.255 in. below the surface, the cooling-time is the same as at the center of the 1-in. bar (namely 11 sec.) Again, in a 2-in. bar similarly quenched (where the cooling-time at the center is 45 sec.), at a position 0.23 in. below the surface the cooling-time is 11 sec. And so, in any bar (larger than a 1-in. and quenched similarly) there is a definite position where the cooling-time is 11 sec. Such positions may be tabulated as follows:

Water Quench

Bar Diameter	Position where the cooling-time was 11 sec.
1 in.	at center
1½ in.	0.255 in. from surface
2 in.	0.23 in. from surface

It is perhaps quite clear that with the same severity of quench and the same bar sizes, these cooling-times would always be reproduced at the same positions. It is perhaps not quite so clear that these *relative positions* would change with a change in severity of quench. As an example consider a 1-in. bar quenched in oil (again with fair agitation). In this oil quench, the cooling-time would of course be longer than in the case of the more drastic water quench, and it has been found by experiment that the cooling-time at the center of the 1-in. bar quenched in oil is about 24 sec.

Now, consider again a 1½-in. bar quenched in the same manner in oil. Here the center cooling-time is about 44 sec., but again (as in the earlier example) proceeding from the center toward the surface of the 1½-in. bar, the cooling-time becomes less; a cooling-time of 24 sec. is encountered about 0.13 in. below the surface of a 1½-in. round. Observe this difference then between the water quench and the oil quench: In the case of the water quench, the center cooling-time of the 1-in. round was encountered 0.255 in. below the surface of the 1½-in. round, whereas in the case of the oil quench, the center cooling-time of the 1-in. round was encountered much closer to

the surface of the 1½-in. round, name-0.13 in. below the surface. (The fact that the cooling-times are different, namely 11 sec. and 24 sec., does not affect the present argument.) As a further datum for the oil quench, it is found in a 2-in. round that the same cooling-time (namely 24 sec.) is found at a positon 0.06 in. below the surface. Setting up the two tabulations for positions of equal cooling-time, for oil and for water (as was done above for water), the following is found:

Water Quench

Bar Diameter	Position where the cooling-time is 11 sec.
1 in.	at center
1½ in.	0.255 in. from surface
2 in.	0.23 in. from surface

Oil Quench

Bar Diameter	Position where the cooling-time is 24 sec.
1 in.	at center
1½ in.	0.13 in. from surface
2 in.	0.06 in. from surface

This illustrates the statement made above, namely that the *relative positions* change with the severity of quench. It will be observed in the above tabulation that the center cooling-time of the 1-in. round is found nearer to the surface of the 1½-in. round when the quench is mild (oil) than when it is more severe (water). The same comment applies of course to the 2-in. round, and the situation will perhaps become more clear in the subsequent discussion of Fig. 7.

The manner of using these obserations becomes more apparent when it is considered that cooling-time is related to hardness. It is clear that if pieces (or positions) of the same steel are cooled alike they will have the same hardness. More specifically, to consider the water quench just cited, the position which has a cooling-time of 11 sec. in one bar will exhibit the same hardness (after the quench) as some other position (in another size of bar) where the cooling-time was also 11 sec. (assuming of course the same steel). Suppose the cooling-time of 11 sec. results in this steel in a Rockwell-C hardness of 48. It is possible then to simply rewrite the tabulation for the water quench, which was shown above, in the following manner, where instead of considering the cooling-time of 11 sec., its resulting hardness of 48 Rockwell-C is considered.

Water Quench

Bar Diameter	Position where the hardness is 48 R_c
1 in.	at center
1½ in.	0.255 in. from surface
2 in.	0.23 in. from surface

Similarly, for a steel (possibly it is the same steel) where a cooling-time of 24 sec. results in a hardness of 40 R_c, a similar tabulation could be made for the oil quench:

Oil Quench

Bar Diameter	Position where the hardness is 40 R_c
1 in.	at center
1½ in	0.13 in. from surface
2 in.	0.06 in. from surface

These hardnesses would be encountered at their respective positions on the hardness distribution curves, as illustrated for example in Figs. 1 and 3 (shown last week). Since it is much easier in practice to determine Rockwell hardness than to determine cooling-time, the Rockwell hardness will be used to estimate severity of quench.

In using the chart, Fig. 4 (shown last week), for calculating severity of quench, it is more convenient to employ the relative distance from the center to the surface than to state it in terms of depth below the surface. Thus, in the case of the water quench, it is better to state that in the 1½-in. bar the cooling-time of 11 sec. was encountered 0.66 of the way from the center to the surface, and in the 2-in. bar that it was encountered at 0.77 of the way from the center to the surface. The corresponding positions in the oil-quenched bars, where a cooling-time of 24 sec. was encountered, were 0.83 and 0.94. These fractions are here called $\frac{Du}{D}$ values. (For explanation of the term $\frac{Du}{D}$, see below.)

The above tabulations, using these new designations, which are the ones employed in the color chart Fig. 4, therefore appear as follows:

Water Quench

Bar Diameter, D	Relative position for $R_c = 48$	Du / D
1 in.	at center	0.0
1½ in.	0.66	0.66
2 in.	0.77	0.77

Oil Quench

Bar Diameter, D	Relative position for $R_c = 40$	Du / D
1 in.	at center	0.0
1½ in.	0.83	0.83
2 in.	0.94	0.94

A diagram may be made in which $\frac{Du}{D}$ is plotted against bar diameter, as in Fig. 7, for oil and for water. The significant point is that the oil quench curve rises more steeply than the water quench curve. The advantage of these curves is that they express the severity of quench quantitatively. With a still milder quench, as in immersing in oil without any stirring whatever, the curve would rise still more steeply; and on the other hand with a still more severe quench, as with a powerful water spray, the curve would incline still more to the right than the one marked "water" in Fig. 7. These curves in Fig. 7 thus state quantitatively what was said in a qualitative way previously, namely that the *relative positions* for equal cooling-times vary with the severity of the quench, and that, with a severe quench, the depth of hardening decreases only slowly with increase in bar size, whereas with a mild quench the depth of hardening decreases rapidly with increase in bar size.

As stated, this is the principle employed to obtain precise figures on the severity of quench, for an examination of the color chart, Fig. 4, shows it to contain a series of orange-colored curves which range from very steep (almost vertical) lines at the left, to curves which bend over quite sharply at the right.

The actual construction and use of the chart involves one further principle. It will be observed that the color chart (shown last week) is marked "D or HD." The D refers to bar diameters, which are to be plotted on the straight vertical black lines. The HD values refer to the product of H (the quenching severity) times D (the bar diameter), and are to be estimated from the orange-colored curves which, as just indicated, range from very steep almost vertical lines to those which curve sharply to the right. The use of these curves is extremely convenient, and their justification should be explained.

The use of HD curves is permissible because it happens that, in bars being quenched, temperature distributions are exactly similar when HD values are alike (i.e., when $H \times D$ is constant). This may be explained as follows.

It will be recalled that H represents the severity of quench, and D is the diameter of the bar. Thus considering, as an example, the value $H \times D = 5$, it could be concluded that in a 1-in. diameter bar treated with a severity of quench $H = 5$ (a good water quench), the temperature distribution (and distribution of cooling-times) is the same as that in a 5-in. diameter bar with a much milder quench $H = 1$ (as in a strong oil quench or a very mild water quench) for in both cases $H \times D = 5$. This refers to *relative* cooling-times and not to *actual* cooling-times, for it is obvious that a 5-in. diameter bar with a mild quench ($H = 1$) will cool very much more slowly than a 1-in. diameter bar quenched strongly ($H = 5$). Thus if the center

of the 1-in. bar at H = 5 has a cooling-time of 11 sec., the center of the 5-in. bar at H = 1 will have a cooling-time of about 274 sec., and it is clear that this is not the similarity to which reference is made. The point is that the *relative* cooling-times at *different positions in the bars* are alike.

Thus, in the 1-in. bar at H = 5, where the cooling-time at the center is 11 sec., the position whose cooling-time is half this value (i.e., the position where the cooling-time is 5½ sec.) will be found at a point about 0.70 of the way from the center to the surface (in the 1-in. bar). In the 5-in. round at H = 1, where the center cooling-time is 274 sec., the position whose cooling-time is half this value (i.e., the position in the 5-in. bar where the cooling-time is 137 sec.) will likewise be found at a point 0.70 of the way from the center to the surface (in the 5-in. bar). This illustrates the meaning of the expression "the temperature distribution is the same when the product H × D is the same." By way of contrast, when the product HD is *not* the same, the relative cooling-times at different positions will vary. When H × D = 2 (for example, a 1-in. bar quenched with a severity H = 2), a cooling-time equal to half the center-cooling-time would be found not at 0.70 but at 0.81 of the way from the center to the surface, and if H × D = 10.0 (for example, a 5-in. bar quenched with a severity H = 2), then a cooling-time equal to half the center-cooling-time would be found at about 0.65 of the way from the center to the surface (instead of 0.70 or 0.81). Thus, it is only when the product H × D is the same that relative coolings at different positons in the bar are the same.

It is now possible to go one step further. Consider two bars, a 1-in. bar and a 1½-in. bar, both quenched with a severity H = 5. Then for the 1-in. bar HD = 5 × 1 = 5, and for the 1½-in. bar, HD = 5 × 1½ = 7.5. Now consider a 5-in. bar and a 7½-in. bar, both quenched with a severity H = 1. For the 5-in. bar, HD = 1 × 5 = 5, and for the 7½-in. bar HD = 1 × 7½ = 7.5. According to the previous argument then, the two pairs of bars would behave analogously as to cooling, because their HD values are in both cases 5 and 7.5. This is the principle employed in the use of the charts in practice, as will appear from the following considerations.

In a 1-in. bar quenched H = 5, the center-cooling-time is about 11 sec., and *in the 1½-in. bar*, quenched H = 5, this cooling-time of 11 sec. is found at *0.66 of the way* from the center to the surface $\frac{Du}{D} = 0.66$. The same is true of the 5-in. bar quenched H = 1 in relation to the *7½*-in. bar, for the cooling-time of the center of the 5-in. bar, 274 sec., is found at *0.66 of the way* from the center to the surface *of the 7½-in. bar. The same would be true for any other pair of bars whose ratio of diameters is 1 to 1½, quenched alike, and so that the HD values are 5.0 and 7.5.* For example, the center and 0.66 positions would be true of bars 2 in. and 3 in. in diameter, quenched H = 2.5, for H × D would be 5.0 and 7.5, and it would likewise be true of bars 4 in. and 6 in. in diameter quenched with a severity H = 1.25, for H × D would again be 5.0 and 7.5.

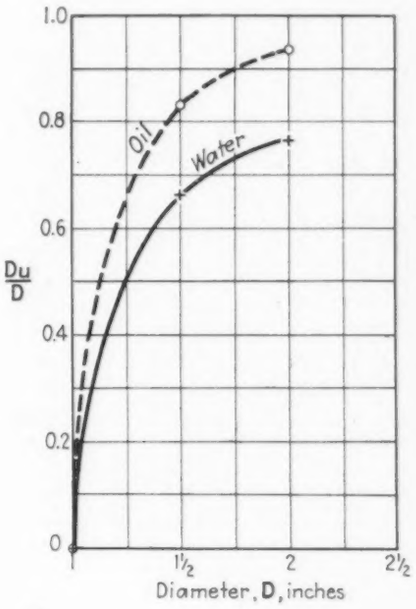


FIG. 7—Relation of $\frac{Du}{D}$ and diameter of round bar for oil and water quenching.

Now in practice when bars have been quenched, the diameter of the bars, D, is known, and it is desired to find H. If HD can be determined for any particular D, H can then be determined (the severity of quench) by merely dividing HD by D. The orange-colored curves (Fig. 4, last week) make it possible to do this, because they represent relative positions for different values of HD. *Each individual curve represents identical cooling-time (and therefore identical hardness) at different positions for a particular set of conditions.* As an example, consider HD = 5.0. On the color chart, Fig. 4, at the left as ordinates are the values $\frac{Du}{D}$, so that the center of a bar, where $\frac{Du}{D} = 0$, is represented by the bottom horizontal line on the chart. The color chart, Fig. 4, is represented by the small reproduction in Fig. 8, the orange-colored lines being replaced by dotted lines. At the base may be seen the values of HD, and the value HD = 5 is found on the base line, indicated by point A. Beginning at the base line at HD = 5, a dotted line will be seen to rise and curve toward the right. On this same curve, at the position $\frac{Du}{D} = 0.66$ (read from the left-hand scale) it may be seen that the dotted curve has reached a position, indicated by point B, where HD (read between the solid vertical lines) is 7.5, and these figures correspond with what has been stated, namely 0.66 at 7.5, see previous text.

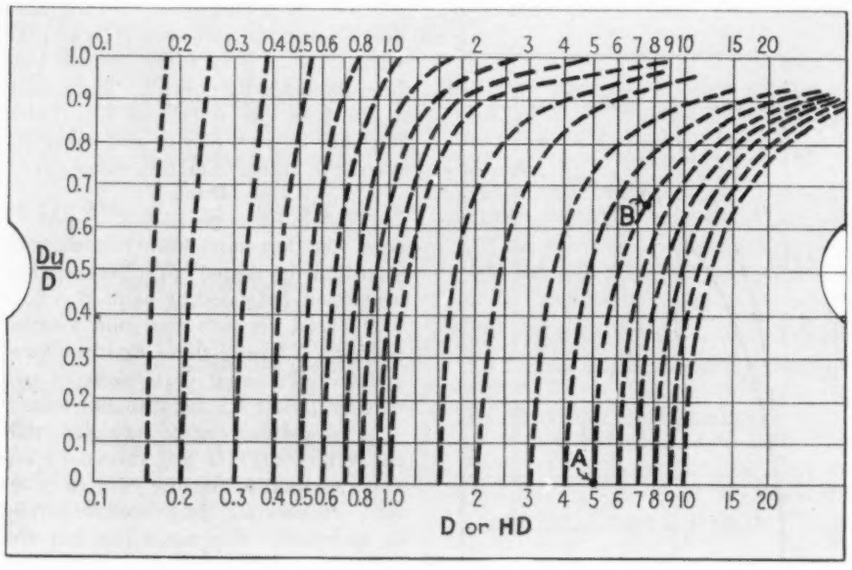
It is assumed here, however, that the values of HD are known in advance, which is not the case in practice. In practice the procedure would be as follows: Suppose a 1-in. bar and a 1½-in. bar of the same steel were quenched alike, in a quench of unknown H value, and that the hardness distributions were as in Fig. 9. In the 1-in. bar, the center hardness is R_c = 52. If on the curve a measurement is made for the 1½-in. bar, it is found that this same hardness, R_c = 52, is encountered at 0.66 of the way from the center to the surface. So for identical hardness (R_c = 52), there obtains,

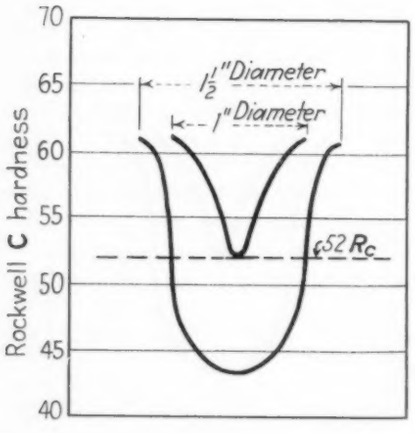
1-in. bar (D = 1.0)... $\frac{Du}{D} = 0$

1½-in. bar (D = 1.5)... $\frac{Du}{D} = 0.66$

So, as in Fig. 10, place a rectangular piece of tissue paper or celluloid over the chart, and on the tissue or celluloid make a small circle at point C, where D = 1.0 and $\frac{Du}{D} = 0$, and another at point E, where D = 1.5 and $\frac{Du}{D} = 0.66$. *Points C and E represent positions of equal hardness in the two bars.* Equal hardness may be used because they are the result of equal cooling-times. To find the correct values of HD, *the top slide, on which the two marks have been made, must now be moved over the chart on which the curves are drawn, until the two points fall on the same curve. The matching of D values against the HD curves is permissible because the printed chart is plotted on a logarithmic scale.* It is found by trial that if the transparent cover (with the two circles now marked on it) is moved to the right, the two circles will fall on the same dotted curve when point C is

at HD = 5.0, point E being then at 7.5, as in Fig. 11. Either of these values may then be used to determine H. Point C represents the 1-in. bar, so that D = 1, and since HD has been found to be 5.0, $H = \frac{HD}{D} = \frac{5.0}{1.0} = 5.0$ Similarly, for point E which represents the 1½-in. bar, HD was found to be 7.5, so that $H = \frac{HD}{D} = \frac{7.5}{1.5} = 5.0$.





ABOVE

FIG. 8—Hardenability and quenching charts. This is the same as Fig. 4, only the colored lines have been replaced by dotted lines.

° ° °

AT LEFT

FIG. 9—Hardness distributions for 1-in. and 1½-in. bars of the same steel quenched alike.

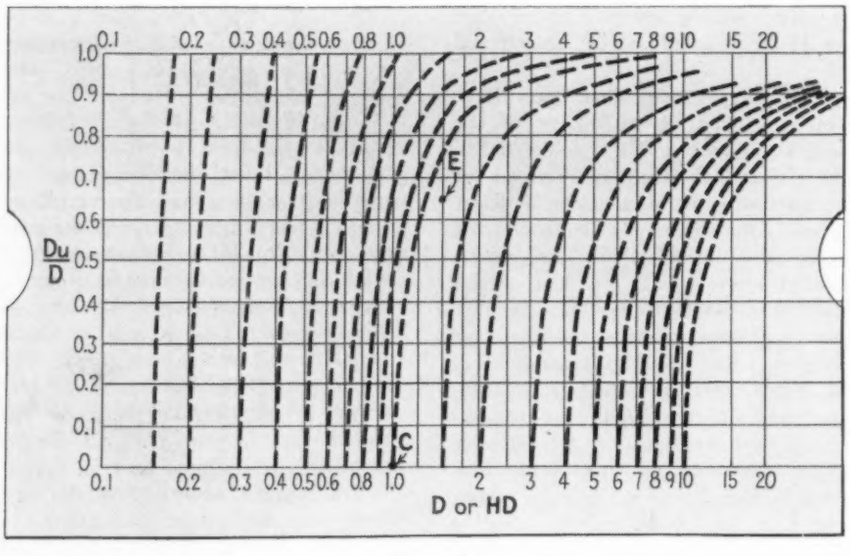


Fig. 10

Now, to ascertain an unknown H-value, consider Fig. 3 (shown last week), a quench of unknown H. The data given in relation to these bars were (see above) as follows:

1-in. bar (D = 1.0)... $\frac{Du}{D} = 0$

1½-in. bar (D = 1.5)... $\frac{Du}{D} = 0.83$

2-in. bar (D = 2.0)... $\frac{Du}{D} = 0.94$

These positions are positions of identical hardness in the three bars. Proceeding in a manner analogous to Fig. 10, small circles are placed at the respective points, as shown for the new quench, in Fig. 12. The celluloid cover slide is now moved *until the three points fall on the same dotted curve,* as shown in Fig. 13. Here the 1-in. point is found to lie at HD = 0.8, so that the severity of quench $H = \frac{HD}{D} = \frac{0.8}{1.0} = 0.8$, hence this particular oil quench represented a quenching severity H = 0.8. The other values likewise check—thus the 2-in. point is now at HD = 1.6, so that $H = \frac{HD}{D} = \frac{1.6}{2.0} = 0.8$.

It should be emphasized that it is not at all necessary, in determining H-values, to include a value where $\frac{Du}{D} = 0$. Any series of sizes may be employed, provided only that the particular hardness selected for the test is present at some position in all of them. It is, however, desirable to have at least one of the $\frac{Du}{D}$ values somewhere near zero, or at least rather low, which is obtained by using a bar of appropriately small size; and another value rather high, obtained by using a bar of appropriately large size; this obviously improves the accuracy of the test.

Further, while it is possible to determine an H-value from only two bars, it is desirable to have at least three and preferably four or more in a test to improve the reliability of the reading. Commercial bars and commercial heat treatments cannot be relied upon to give an accurate H-value from only two points (since this is difficult even under carefully controlled laboratory conditions).

Origin, Significance of $\frac{Du}{D}$

The term Du originated as a designation for the "unhardened diameter."

This has reference to the unhardened "core," in a bar which has been hardened in such a way that it displays a distinct "hardened rim," either in a fracture test or more precisely in an etch test. While it is quite correct, in determining the severity of quench, to consider the diameter at any selected hardness, the measurements become much more precise when taken at the boundary between "rim" and "core." The reason for this is illustrated in Fig. 14.

At the top of Fig. 14 is a schematic representation of a quenched bar having a hardened rim and an unhardened core. Below this is shown the corresponding Rockwell hardness distribution curve. The increased precision at the position of the unhardened core is illustrated by positions A and B. The solid horizontal line A represents one hardness level that might be selected for estimating severity of quench, and B represents another level, in the latter case at the boundary of rim and core. At position B the drop in hardness is steep, so that even though a considerable error be made in the hardness readings, as indicated by the horizontal dotted lines just above and below the solid line B, the error in *position*, that is the error in diameter Du, would still be only very slight, as indicated by the distance Y. By contrast, it is seen that if a similar variation in hardness readings occurs at position A, then the error might become very considerable, as indicated at X. And since the whole scheme depends on measurement of Du, it is clear that B is the better position for accuracy.

It is therefore a general principle in measuring severity of quench that the readings should if possible be taken at the position where the hardness curve is steepest, there being usually an inflection in the hardness curve. If such a range of hardness is not available, an approximate value can still be obtained, for example, when only the high hardnesses or the low hardnesses are available, but it must be remembered that these are very likely to provide a less accurate value of H, due to the practical impossibility of estimating the positions accurately.

It may be noted that the point of inflection of the curve, as at position B in Fig. 14, is at the position where the structure is about 50 per cent martensite and 50 per cent fine pearlite (nodular troostite), and if the quenched bar shows a hardened rim and an unhardened core upon etching the cross-section, then accurate Du values may be obtained by measuring directly on the etched cross-section. The locat-

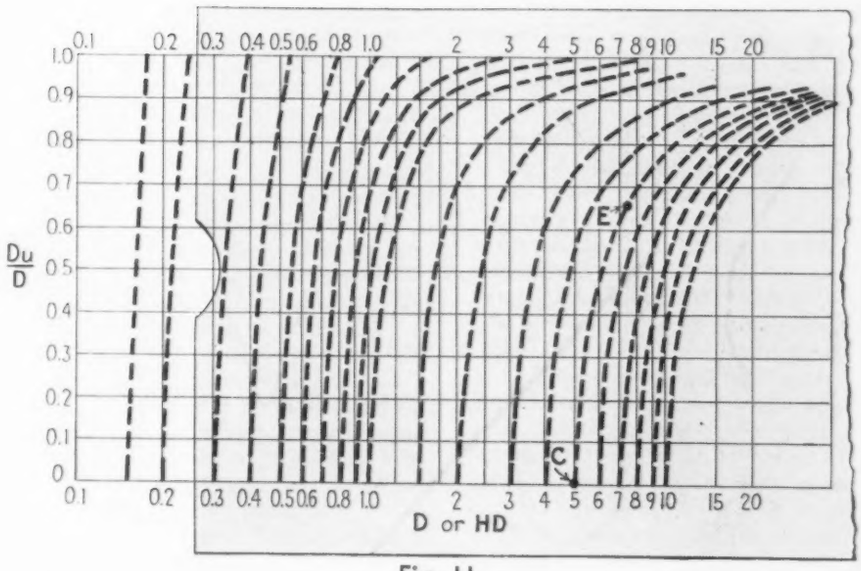


Fig. 11

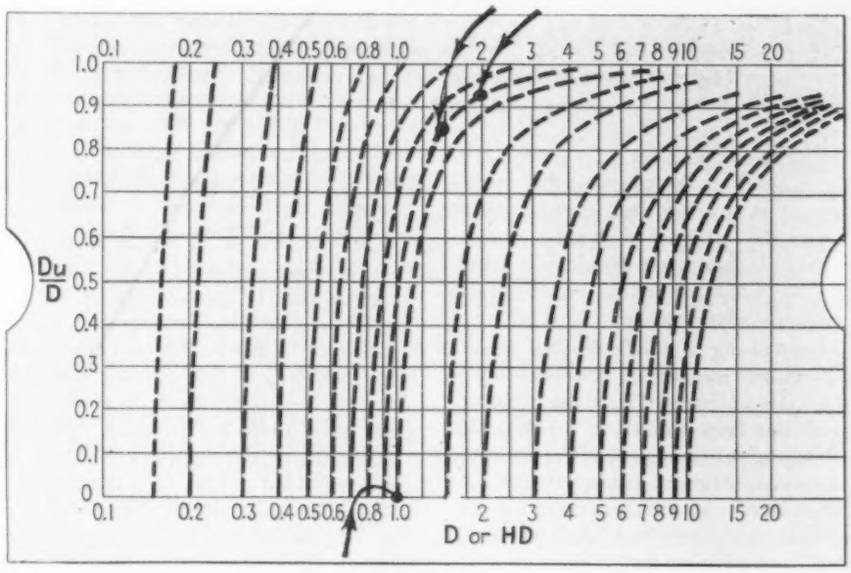


Fig. 12

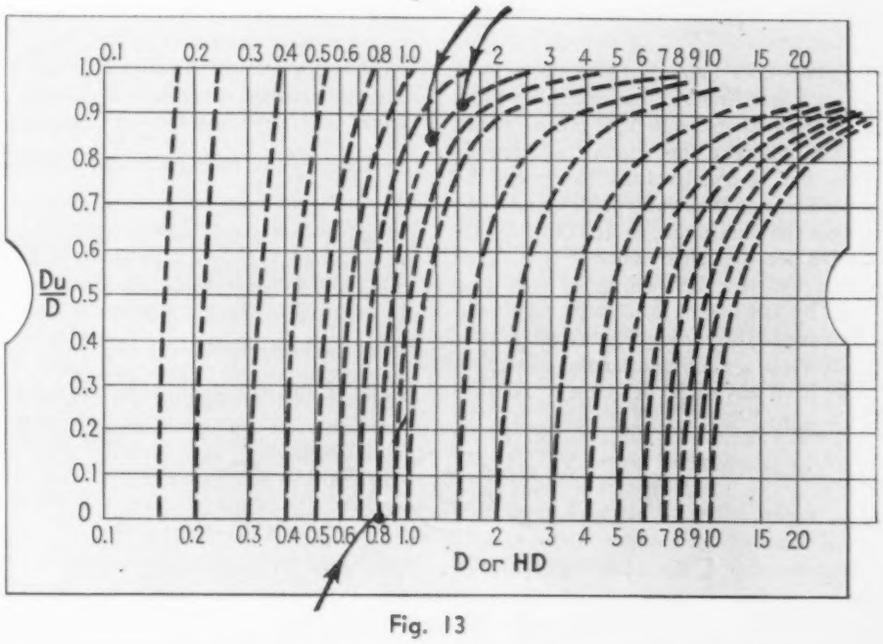


Fig. 13

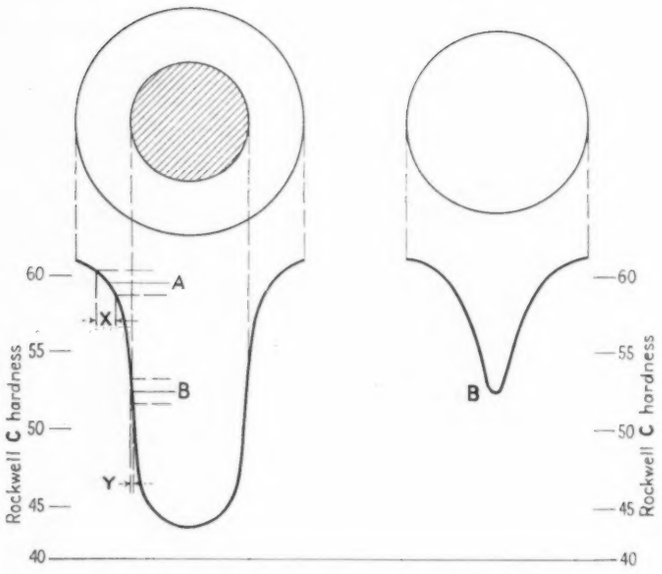


FIG. 14 (left) and Fig. 15 (right):—Hardness distribution curves for quenched bar having a hardened rim and an unhardened core (at left), and hardened throughout with unhardened core just absent (at right).

ing of the exact position is made easier by examining the piece on the microscope, in order to locate the position where the structure is 50 per cent martensite. When this is possible, it avoids the necessity for taking any hardness readings whatever.

In making a hardenability test, a convenient measure of hardenability is the critical size. The name "critical size" has been applied to the diameter of bar which is of such size that the "unhardened core" is just absent. In other words, all sizes smaller than the critical size are "hardened throughout," and all sizes larger than the critical size have an unhardened core. Thus in Fig. 16, C is about the critical size.

This does not mean that the critical size is hardened to maximum hardness throughout its section; it means rather that, whereas the surface portion of the bar is usually fully hardened, the hardness at the center is definitely less than the maximum, as at B in Fig. 15. This becomes clear when it is realized that the so-called hardened rim does not by any means possess its maximum hardness throughout; it drops gradually from a maximum at the outside to the hardness of 50 per cent martensite and 50 per cent fine pearlite (nodular troostite) at the line of demarcation between the "rim" and the "core."

In practice, it is not necessary to test a whole series of bars to find the critical size. If the severity of quench is known, through having been determined on a particular quenching set-up, then only a single test of any unknown steel is needed to find the critical size, provided the bar tested is larger than the critical size, that is to say provided it has an unhardened core. As an example, suppose it has been found that a particular quenching set-up provides a severity of quench H = 3.0. Suppose now an unknown steel is quenched in this set-up, in a bar diameter D = 1½ in., and assume further that in this 1½-in. bar the unhardened core has a diameter equal to 7/10ths of the bar diameter, so that $\frac{Du}{D} = 0.70$. The color chart, Fig. 4, may now be used to estimate the critical size as follows: Since H = 3.0, and D = 1.5, the product HD is 4.5. The *vertical black* line H = 4.5 is followed to the point where it intersects the horizontal black line $\frac{Du}{D} = 0.70$. At this intersection there is found a curved orange line, and this line may now be followed downward to the left until it reaches the base line, where $\frac{Du}{D} = 0$, and it is found to reach the base line at the position where HD = 3.0.

By the above definition, the critical size is the size where the unhardened core is just 0, so that $\frac{Du}{D}$ is 0, hence the point just found represents the critical size. As stated, at the critical size it has been found in this case that HD = 3.0. Since the severity of quench was 3.0, it is known that the critical size $D = \frac{HD}{D} = \frac{3.0}{3.0} = 1.0$ The critical size of this steel in this quench was, therefore, D = 1.0, and this was ascertained by quenching and examining only a single bar of steel.

Various means may thus be employed for ascertaining the critical size, but no matter how the critical size is obtained, it is known that it is not only a function of the hardenability of the steel but also of the severity of the quench. Thus, a milder quench would give a smaller critical size and a more severe quench would obviously give a larger critical size. There would, therefore, be no means of comparing hardenabilities determined under different quenching conditions or by different operators unless they were all referred to a single severity of quench. For such a standard severity of quench, to which all quenches may be referred, it is convenient to use the most severe quench possible, which is here called the "ideal quench." The two charts for ideal critical size, Figs. 5 and 6 (shown last week), show the critical size which would have been obtained with the severest possible quench (namely, one in which the outside of the bar was cooled instantly to room temperature). As an example, consider a steel whose critical size D is 1.2 when the severity of quench H is 1.0. Using Fig. 6, consult the left-hand scale marked D values and find the value D = 1.2. Follow this on the horizontal line across to the right until it intersects the inclined line which (at its upper right-hand end) is marked 1.0, indicating a quenching severity H = 1.0. At this intersection, follow the vertical black line downward and it will be found to show 2.0. This means that, when the critical size was 1.2 with a severity of quench 1.0, the critical size would have been 2.0 in. had the quench been ideal. In other words, 2.0 is the "ideal critical size"; $D_I = 2.0$, which is an accurate designation of the hardenability of this steel.

FIG. 16—The critical size of this steel is C—all sizes larger have an unhardened core and all sizes smaller are hardened throughout.

By thus referring all actual critical size determintions to an ideal quench, hardenabilities may be compared directly, even when the actual quenches differed.

It might be objected that the above is a very complicated procedure for ascertaining the hardenability of a steel, or for comparing the hardenabilities of different steels. Thus it could be contended that a much simpler procedure is merely to measure the depth of hardening on a selected size of bar. Now while it is true that the latter method is perfectly accurate when all the data are known, the difficulty is that the severity of quench is usually unknown, and this may affect the results profoundly. If on the other hand the severity of quench is known, then the procedure can be made to give the desired results with a single bar, the necessary steps having been previously explained.

As an example of the importance of the severity of the quench, suppose two laboratories are examining the same steel, both using 1-in. diameter bars and both using a water quench. It could easily happen that one laboratory would find a depth of hardening of 0.25 in., while the other found 0.40 in., for this would involve only a moderate difference of severity of quench, such as H = 2.0 compared with H = 3.0. This is not a very great variation of H, as may be seen from the following table which illustrates the range of H-values that may be encountered in practice. (The table comprises the experience to date in collecting H-values from a variety of sources.)

Table of H-Values

Mode of Cooling	Air	Oil	Water	Brine
Specimen and coolant still	0.02	0.30	1.0	2.2
Specimen moved moderately in still coolant	...	0.4 to 0.6	1.5 to 3.0	..
Specimen moved strongly in still coolant	...	0.6 to 0.8	3.0 to 6.0	7.5
Strong to violent current or spray of coolant	...	1.0 to 1.7	6.0 to 12.0	..

The situation thus resolves itself into the following points which must be taken into account:

(I) In order to make hardenability determinations from different laboratories interchangeable, they must all be referred to the identical severity of quench. It is true that any severity of quench could arbitrarily be selected, for example H = 1.0 (a strong oil quench), or H = 2.5 (a medium water quench), or H = 7.5 (a good brine quench), or H = 10.0 (a strong water quench). However, the reason for here adopting the ideal (severest possible) quench is that it seems convenient to think of hardenability in terms of the greatest possible extent of hardening that could be induced by any quench, all of the actual hardenings being somewhat less than this, depending on the quenching severity.

(II) Assuming a standardized severity of quench, the next step is to decide on a criterion of hardenability, such as susceptibility to complete hardening (100 per cent martensite), or, as has sometimes been done, almost complete hardening, say 95 to 97 per cent martensite (the criterion of this condition being the readily discoverable presence of 3 to 5 per cent fine pearlite), and the same remarks could conceivably apply to any other arbitrarily selected degree of hardening, such as 90 per cent martensite, 70 per cent or 50 per cent. The argument in favor of using the 50 per cent martensite point is that this is the most sensitive and most easily measured position in a quenched bar. As discussed above, this 50 per cent line is the boundary between hardened rim and unhardened core, and has been used for many years to judge the depth of hardening (rather than the depth to which the bar is 100 per cent hardened, or 97 per cent hardened, etc.).

(III) If then it seems logical to use the extent of "hardened rim" as a criterion, what is the most logical manner of using it? It would conceivably be possible to standardize the size of bar, and let the depth of hardening be the criterion of hardenability. Thus one could select a 1-in. diameter bar (or a 2-in. diameter, etc.), and define hardenability in terms of depth of hardening on this standardized size (referred to the ideal quench according to argument No. I). However, because of the wide range of hardenabilities encountered in commercial steels (commonly between 0.8 and 4.0 in. in terms of ideal critical diameter), the selection of a standard size on which depth of hardening could always be measured would present a perplexing problem as far as accuracy is concerned (too much hardening on a small size and too little on a large size).

As previously explained, the designation for hardenability adopted here is the size in which the hardened rim just extends to the center (that is, the unhardened core is just absent). This criterion has a special advantage in determining hardenability in practice, since the diameter where the unhardened core is small is very sensitive to changes in hardenability, much more so than when the bar diameter is such that the unhardened core is large. As an example of this important behavior, consider an attempt to differentiate between two steels, assuming (for convenience in illustration) that the hardenabilities are those represented by D_I = 1.3 and 1.5 in., respectively, and assume that in the actual experiment the quenching severity is H = 3.0. If a 1¼-in. diameter bar of each of these steels is quenched thus (H = 3.0), then the two steels will have unhardened cores $\frac{Du}{D}$ = 0.55 and 0.22, respectively, whereas if the same steels are quenched as 2-in. bars, the unhardened cores will be $\frac{Du}{D}$ = 0.80 and 0.74, respectively. The sensitiveness is thus much greater in the 1¼-in. bar, which is in the neighborhood of the critical sizes (the critical sizes being 1.0 and 1.2 in., respectively, in this quench). This may be stated in another way by saying that in a 1¼-in. bar the depths of hardening will be 0.28 and 0.49 in., respectively, whereas in a 2-in. bar they will be 0.20 and 0.26 in., respectively. The greater ease of differentiating near the critical size thus becomes apparent, so that a great experimental advantage in the direction of accuracy is obtained by testing sizes in the neighborhood of the expected critical size.

This behavior is due to the nature of the heat flow in bars being quenched, the difference in cooling-time being less pronounced in the inner regions of the bar than in its outer portions.

The ideal critical size, D_I, therefore seems useful as a measure of hardenability because

(1) It is a true measure of hardenability alone, since it refers to a constant severity of quench.

(2) It is accurate because the actual critical size (from which it is computed) can be determined with accuracy.

(3) It is readily applicable to all hardenabilities, high or low.

(4) It is related to an already familiar manner of testing, namely the depth of hardening.

(5) It is rather readily visualized for practical application because it is the size which will just "harden throughout" in the severest possible quench.

Causes of Non-Ferrous

. . . Table lists 22 types of defects and grades causes according to degree of probability. Most

DEFECT ↓ / CAUSES →	DESIGN	PATTERN EQUIPMENT	MOLD SETTING	GATING
1. *Shrinkage Cracks and Cavities*— Formed by the metal pulling itself apart while cooling in the mold. Walls of these cracks and cavities are often discolored.	Adjacent position of heavy and light sections. Lack fillets. (1)			Inadequate gating requiring excessive pouring temperature. Inadequate feeding of heavy sections. (2)
2. *Shift*— Mismatch of the cope and drag at parting line.		Loose, bent, or poorly fitting dowel pins on flasks. (1)		
3. *Fins or Strains*— Excessive fins or flash along parting line.		Match plates thicker in the middle than near the edges. Match plates excessively flexible. Weak bottom boards. (1)	Improper placing of the mold on the pouring racks and improper or insufficient weighting of the mold. (3)	
4. *Variation in Wall Thickness*— Casting with wall thicknesses, too heavy, too light, or thick on side and thin on the other.		Oversize cores (wear on core boxes). Oversize core prints allowing core float or shift. (1)		
5. *Cold Shut*— Apparent crack, or weakness which may result in crack, due to lack of proper knitting where two feeding streams meet.			Insufficient pouring head. (3)	Inadequate gating. Restriction in gate or runner. (1)
6. *Wormy Surface*— Irregular shallow elongated depressions in the vicinity of the gate, similar to worm tracks, often filled with zinc oxide. Sometimes accompanied by poor fractures.				Inadequate gating. (1)
7. *Crush*— Displacement of sand when closing the mold. Usually an irregular depression in the casting.		Core print too small for core. (2)	Excessive weighting of mold. (3)	
8. *Swell*— Displacement of sand caused by pressure of molten metal. Usually a bulge on the cope side.			Insufficient weight on mold when poured. (2)	
9. *Sand Wash*— Rough lumps of metal at some points of casting and rough holes or depressions at other points.		Rough surface of patterns. Insufficient draft on patterns weakening sand on withdrawal. (4)		Weak areas of sand around gate. Sharp corners at gate. (1)
10. *Scab*— Rough, slightly raised areas on surface of casting, often with some sand embedded.				
11. *Sand Blow*— Excessively smooth depressed area on outer surface of casting.				Excessive metal impingement on small area of sand. (3)
12. *Core Blow*— Excessively smooth depressed area on inner surface of cored casting or gas pocket in casting above cored cavity.		Insufficient core print for venting. (3)		
13. *Sand Sticking in Cored Cavities*— Adherent coating of sand, no evidence of "burning in," difficult to remove from small and remote internal cored cavities.				
14. *Surface Stains*— Black discolorations of varying size and shape on surface of casting.				
15. *Burning Into Sand*— Rough sandy appearance of outer part of casting with some sand embedded in surface.				
16. *Burning Into Core*— Rough sandy appearance of inner part of casting with some sand embedded in the inner surface, or metal fins penetrating into core and holding grains of core sand.				
17. *Weak or Discontinuous Structure*— A dendritic structure with minute cavities or voids between large crystals. Fractures (in bronze) badly discolored and granular non-fibrous in appearance.	Heavy sections adjoining light sections making it impossible to provide adequate feeding. (5)			Inadequate gate requiring high pouring temperature. Inadequate feeding of heavy sections. (4)
18. *Rough or Pitted Surface*— Rough surfaces on castings, some angular fairly deep pits, but with no apparent sand wash or crush.		Rough patterns. (5)		
19. *Gas Holes*— Spherical gas holes under or near surface of casting. Inside of gas cavities untarnished.	Inadequate fillets on pattern or too thin sections requiring excessively high pouring temperatures. (6)			
20. *Tin or Lead Sweat*— Spots, lumps, or a thin layer of white metal on surface of casting.				
**21. *Solid Inclusions*— ** Pieces of nonmetallic materials or separate particles of metal showing in walls of casting when fractured or machined.				Improper gating. (3)
22. *Misrun*— Incompletely filled mold cavity; lugs or corners not filled out. Smoothly rounded hold through wall of casting.			Insufficient height of sprue. (2)	Too small gate. (3)

Casting Defects . . .

By SAM TOUR
Vice-president, Lucius Pitkin, Inc.

probable cause indicated (1); second most probable by (2); third most probable by (3), etc.

MOLDING	MOLDING SAND	CORES	METAL	MELTING	POURING
			Metal contaminated with impurities which cause hot shortness. (4)		Excessive pouring temperatures. Too low a pouring temperature. (3)
Sand shift during roll over. (2)	Low flowability of sand causes ram-off. (3)				
Excessive rapping of the pattern or match preparatory to withdrawal of pattern. (2)		Improper match between molding sand and core. (4)			
Excessive rapping of pattern resulting in oversize core print impressions. Uneven ramming of mold. (2)		Excessive shaving. Excessive Coatings. Lifting due to insufficient reinforcement. (3)			
Insufficient venting. (5)	Wet sand. Low permeability of sand. (1)		Metal sluggish due to contamination in metal as charged or by contamination in the furnace. Sulphur, oxygen or gas. (7)	Improper melting resulting in gas absorption and sluggish metal. (6)	Metal too cold. Improper skimming allowing dross or slag to enter sprue. (2)
	Inadequate venting. (3)		Silicon or aluminum contamination of leaded alloys. Phosphorus additions to high zinc alloys. (2)		
Carelessness on part of molder. (1)		Oversized cores. (4)			
Too light ramming of cope. (1)					
Too light ramming. (2)	Weak sand (insufficient bond). (3)	Overbaked core. Poorly bonded core. Core crush. (5)			
Excessive density of sand due to too heavy ramming. (1)	Sand too fine. Lack of permeability. (2)				
Insufficient venting. (1)	Sand too wet. Lack of permeability of sand. (2)				
Inadequate venting from core print. (2)		Insufficient baking. Moisture pick-up after baking. (1)			
		Improper or no core wash. (Rubber core wash may be used). Insufficient clay bond in core sand. (1)			
Excessive flour or molasses used on mold. (2)		Excessive molasses or other organic type of core wash. (1)	Excessively high alloyed iron. (3)		
	Sand too coarse. Sand too dry. Sand with too high permeability. (2)		Excessive metal fluidity as from phosphorus. (1)		Excessive pouring temperature. (3)
		Overbaked cores. Too rapidly baked cores. Poorly bonded cores. Insufficient clay bond in core sand. (2)	Excessive metal fluidity as from phosphorus. (1)		Excessive pouring temperatures. (3)
			Contamination of leaded alloys by silicon or aluminum. (2)	Gassing during melting. (1)	Excessive pouring temperature. (3)
Careless molding leaving loose sand in cavity. (1)	Coarse particles of cores or metal in molding sand. (2)			Melting with highly fluid fluxes which cannot be skimmed off. (3)	Slag or dross allowed to enter sprue during pouring. (4)
Inadequate venting. (7)	Wet sand. Excessive new sand in sand mix. (3)	Poorly dried or improperly vented cores. (4)	Metal contamination as charged. Sulphur dioxide, hydrogen. (5)	Gas absorption during melting. Sulphur dioxide, hydrogen. (1)	Too high pouring temperature. (2)
			Silicon or aluminum contamination in charge. (2)	Absorption of reducing gasses during melting or holding. Silicon or aluminum contamination during melting. (1)	Excessive pouring temperature coupled with high phosphorus. Metal not properly stirred before pouring. (3)
				Use of excessively fluid slags or fluxes. (2)	Careless or faulty skimming and pouring. (1)
	Sand too wet. Low permeability of sand. (1)		Metal as charged contaminated with sulphur dioxide, oxygen or hydrogen. (6)	Metal gassed and made sluggish in melting. (5)	Interruption of pour. Too slow pour. Too cold metal. (1)

ANTI-PIPING COMPOUNDS

At the May meeting of the (British) Iron and Steel Institute, E. Gregory will present a paper dealing with "Anti-piping Compounds and Their Influence on Major Segregation in Steel Ingots." This report will detail work carried out on behalf of the Committee on the Heterogeneity of Steel Ingots. Anti-piping compounds are sometimes used on steel ingots and on the runners and risers of steel castings, and since there is considerable interest in these problems, certain sections from Dr. Gregory's paper are given herein.

As is well known, the formation of a contraction cavity, technically described as a "pipe," in an ingot of fully killed steel is inevitable, since it is a natural consequence of the fact that the density of the liquid metal is less than that of the solid, *i.e.*, a marked contraction in volume occurs during solidification. The shape and extent of the pipe depend upon such factors as the shape of the mold, the casting temperature and the chemical composition of the steel. Higher carbon steels pipe to a greater extent than those of lower carbon contents, and the elements commonly employed as deoxidizers, notably silicon and aluminum, tend to exaggerate the volume change that occurs during freezing, and thus lead to a more extensive pipe. High teeming temperatures also tend to exaggerate the length of the pipe.

The main object of using anti-piping compounds, says Dr. Gregory, has been to confine the primary pipe within the feeder head and so to increase the proportion of useful material. Matuscha (Journal, Iron and Steel Institute, 1938, No. I, p. 109) has previously shown that these compounds exert a marked effect on the shape and disposition of the pipe.

The term "anti-piping" is somewhat unfortunate and to some extent is misleading, since, as already stated, pipe cannot be avoided in killed steels, as it is a natural consequence of the contraction that occurs during freezing. By means of these compounds, which are added in the form of powder to the surface of the molten metal in the feeder head immediately after casting, a reservoir of liquid steel is maintained in the head for a much more extended period. The result is the formation of an "open" pipe (*i.e.*, there is no bridging) in the feeder head, as shown in the accompanying illustration. The section indicated in the middle represents the ideal case where the primary pipe consists essentially of a hollow shell. More often, however, the pipe takes the form of a hollow cone, as represented at the right, in which case there is a greater possibility of the pipe extending into the body of the ingot.

The chemical compositions of the different proprietary anti-piping compounds differ considerably, as is evident from the accompanying table.

Generally, therefore, these compounds consist essentially of mixtures of carbonaceous matter and irreducible oxides. When placed on the surface of the molten steel, the carbon and any other elements present slowly oxidize, thereby generating heat. The non-metallic matter in the powder remains as a residue which serves to insulate the molten metal beneath. It is this combination of heat generating and heat insulating properties which serves to delay the freezing of the metal in the head to such a marked extent.*

As is well known, the old practice of covering the molten metal with hot coke had a similar object in view. The difficulty with coke was that considerable carbon absorption took place, often accompanied by an exaggerated pipe. Earlier experiments also indicated that carbon was absorbed from the anti-piping powders by the molten metal in contact with it. With some low-carbon steels, which normally do not pipe to any marked extent, carbon absorption occurred to such an extent as to convert them, in so far as the freezing of the metal in the head was concerned, into "fully-piping" steels. Later, however, compound No. 5 was obtained and the amount of carbon pick-up was then reduced to negligible proportions, even though it is rich in carbon. This compound was exclusively employed in the experiments recorded in Dr. Gregory's paper.

The primary object of this series of experiments was to determine the

TABLE I.

COMPOSITIONS OF PROPRIETARY ANTI-PIPING COMPOUNDS

Per cent	1	2	3	4	5
Al_2O_3	41.65	62.20	7.56	13.43	13.09
SiO_2	4.59	18.20	22.50	22.10	18.60
Fe_2O_3	2.52	2.60	3.50	6.10	1.71
CaO	2.09	3.50	—	0.80	—
MnO	0.17	—	0.44	—	0.09
MnO_2	—	—	—	—	—
Na_2O	4.24	—	0.72	—	0.636
K_2O	—	—			
CO_2	6.02	—	—	—	—
Mg	—	—	—	—	0.52
MgO	0.52	2.89	0.21	0.65	0.23
CuO	—	1.20	—	—	—
NaCl	—	2.18	—	—	—
KCl	—	0.36	—	—	—
Carbonaceous matter	21.33	6.80	59.56	48.17	60.45
Volatile matter	—	—	—	8.50	—
Loss on ignition	—	—	—	56.82	63.50

*For additional data on anti-piping compounds, see THE IRON AGE, May 12, 1938, p. 47.—Ed.

extent of the piped parts of blooms rolled from ingots cast (*a*) in the ordinary way, (*b*) treated with anti-piping compounds, and (*c*) treated with anti-piping compounds and then "after-teemed." In the latter case, the feeder head was refilled with molten steel after several other ingots had been cast.

When using the anti-piping compound alone, a period of about 1 hr. elapsed between the casting of the ingot and the final freezing of the liquid metal surface in the head. During this period the liquid surface gradually sank to the extent of between 8 and 10 in. When both the powder and after-teeming were resorted to, the metal in the head remained molten for a period of between 1½ and 2 hr.

The object of after-teeming, of course, was to replenish the supply of liquid in the head and still further delay its freezing so as to obtain a shorter and more squat pipe of the type indicated in the middle of the accompanying illustration. Generally, in regard to pipe, the anticipated results were obtained, as was disclosed by sulphur prints. For certain steels, anti-piping compounds yield excellent results without the need of after-teeming; in some instances, there are definitely some disadvantages associated with the use of these powders.

Ingots were also cast and covered with asbestos sheet instead of the anti-piping compound in order to delay the freezing of the steel in the head. Even though only ⅛ in. in thickness, the asbestos was effective enough to permit of after-teeming, but the results obtained, although an improvement on the ordinary method of casting, were not quite so satisfactory as might have been expected. The extent of the pipe was generally less, but bridging almost invariably took place.

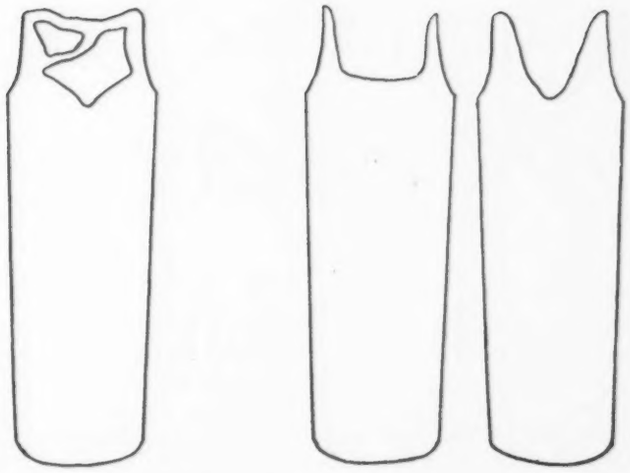
The main object of Mr. Gregory's paper was to draw attention to the influence of delayed freezing of the metal in the head on the position of the major segregates.

An examination of sulphur prints clearly showed that the zones richest in impurities are nearest the top in the ingots treated with anti-piping compound and after-teemed, and occupy the lowest positions in ingots not treated in any way. Generally, too, the segregated zone does not extend so far, *i.e.*, is much less elongated in the treated ingots that are after-teemed.

In order to determine the magnitude of the major segregation, drillings were taken from blooms and analyzed. It was observed that there is a really astounding concentration of the impurities sulphur, phosphorus, carbon and manganese in the middle positions of the major segregates.

In the "asbestos" series, similar results were obtained. The segregated zones, however, were considerably less rich in impurities, as might be expected from the fact that the freezing of the liquid metal in the head was not nearly so much delayed.

It was noted also that in the asbestos treated ingots, the segregated zones are more elongated and not so clearly defined, even when after-teemed. A noteworthy feature is that there is apparently no connection between the base of the pipe and the position of the major segregate. These facts are considered as being significant.



CONTRACTION cavity in an untreated steel ingot (left); contraction cavities in ingots treated with anti-piping compounds—(middle) ideal: (right) more usual form.

Inspecting Automatic Controls on a Keller Machine

Billy B. Van, mayor of Newport, N. H., and radio commentator, inspects the automatic controls on a Keller machine under construction in the new plant of the Pratt & Whitney division, Niles-Bement-Pond Co., West Hartford, Conn. Left to right: Alexander S. Keller, manager, Keller division; William P. Kirk, sales manager, machinery division; Mr. Van; and Edwin C. Shultz, Pratt & Whitney advertising manager.

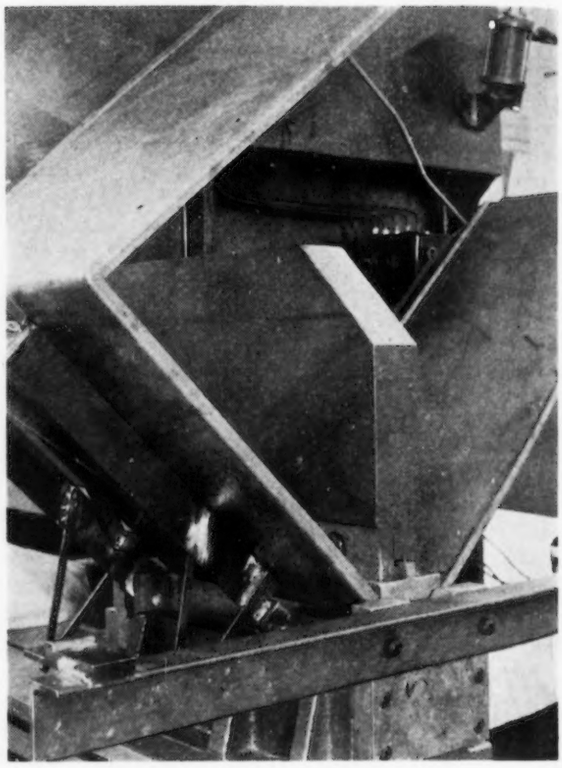
BRAKE FABRICATION WITHOUT REVERSE BENDING

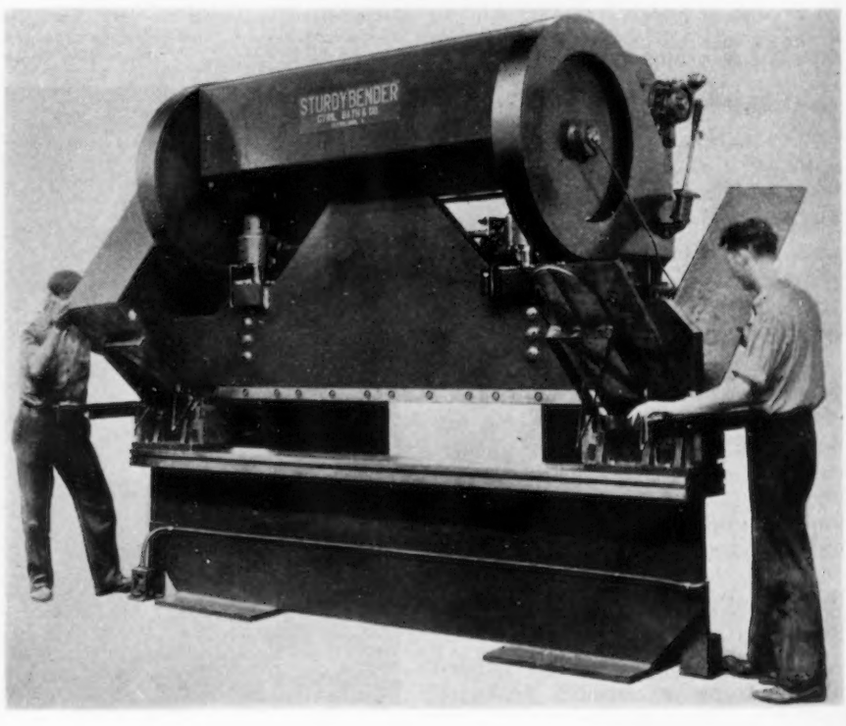
LARGE metal boxes of light gage material may be manufactured at low cost on bending presses. However a problem often encountered is a reverse bend, inadvertently formed in the sheet. This reverse bend is due to a whip in the sheet, which in turn is due to the difficulty of supporting the metal during the action of the press. When done by hand, work of this kind requires skilled operators and is often a slow process. The accompanying photographs show the manner in which Cyril Bath & Co., Cleveland, manufacturers and distributers of bending presses and special machinery, have met this problem in forming the inner liner of a typical refrigerator.

The sheets are first blanked and then formed on bending presses. The one photograph shows the bending of the straight flanged sheet into the desired box section. This is done by a special fixture which supports the metal during the process of bending, the gaging being done from holes already punched in the sheet for other purposes. The die is a triple action die, and the flanges are taken around the corner smoothly by special spring die arrangement. The raising or supporting arms prevent the occurrence of reverse bands and put the operation on a production basis. The work is being done in a press with overhung bed and ram on each end, so that with two operators a completed box is finished and ready for the back to be welded at better than 80 per hr.

Corners of Larger Radius

A secondary problem is also illustrated by this operation. It is frequently desirable to make boxes with flanged edges without cutting out the corners, and this can be done by making the corners of a larger radius instead of a sharp corner, as is done on the front edge of the cabinet shown in the close-up view. The back edge has a developed notch in it, because the back is welded over the flange at this point. This process avoids a costly welding and hand finish operation on the front flange. Because hand finishing operations in sheet metal have a cost out of all relation to their significance, a device of this kind may well show a quite surprising cost reduction. Cyril Bath & Co. claim that the principle of so supporting the sheet is applicable to any production problem where the handling of the work causes reverse bends, or where the work is a source of danger to the operators when so handled. The manufacturers also claim a very material increase in production in much work of this kind, due to the reduction of operator fatigue and are of the opinion that some bending operations could be entirely automatic upon extension of the use of the method shown.





OPERATORS DEBATE OPEN HEARTH PROBLEMS

ESTABLISHING new records as regards attendance, the twenty-third convention of the Open Hearth Committee of the American Institute of Mining and Metallurgical Engineers last week in Pittsburgh was particularly conspicuous because of the number and variety of problems brought up for discussion. Total registration was well over 700, as compared with an attendance of 600 at the previous year's meeting in Cleveland.

As has been the practice for the past few years, the Blast Furnace and Raw Materials Committee of the A.I.M.E. conducted simultaneous meetings along with the Open Hearth Committee, and for the first time the activities of the latter committee were split into simultaneous sessions dealing with basic open hearth and acid open hearth problems. It is apparent, therefore, that this yearly meeting of open hearth operators to debate mutual problems has now become quite an ambitious affair, with attendance growing yearly and activities split up into three different groups of simultaneous sessions.

At the general business meeting of the Open Hearth Committee it was decided to hold next year's convention at The Palmer House in Chicago. The decision was also made to increase the current scholarship supported by the Committee at the Massachusetts Institute of Technology to a full scholarship taking care of all expenditures. And, in addition, the committee completed plans for an annual F. B. McKune award, which involves a monetary prize of one hundred dollars for the best paper to be presented at each yearly meeting by a man under 35 years of age.

Refractories, Maintenance of Furnace Walls, Hot-Top Compounds, Etc.

MUCH of the discussion of the opening session, Wednesday morning, of the Open Hearth Committee dealt with refractories. Information was given on the minimization of inclusions in steel through improved runner linings, ladle bricks, nozzle well materials, and considerable data were presented by various operators on different nozzle bricks, nozzle design and size, and performance. Quite a bit of attention was given to the use of Ramix (made by Basic Dolomite) refractory in open hearth furnaces.

Quite a few electric furnaces are using Ramix bottoms. For instance, P. A. MacIsaac, of Dominion Steel, reported on a rammed up Ramix bottom for a 10-ton electric furnace, the bottom lining being 24 in. running up to a 13½ in. side wall. To date, 3500 heats have been tapped out of this furnace and no trouble has been experienced with the refractory. Several operators also reported on the use of Ramix as a patching material in open hearths. It was stated that the material has been used in holes 12 to 15 in. deep with an area of 2 sq. ft., and within one hour of ramming in the Ramix the charge has been laid down. Another operator described a Ramix bottom on a 100-ton open hearth. In the first six months of operation 245 heats came out of this furnace, after which the furnace was down for a year, subsequently to be used again for a run of 375 heats. It was stated that the bottom was little different than a burned in bottom. The general consensus was that Ramix is an excellent material with regard to ease and speed of application, both for bottoms and for repairs.

There followed some discussion of chrome ramming mixes for bottoms,

and a number of operators reported on very satisfactory use of this type of material over a period of several years.

At the end of the morning session discussion was called for on hot-top compounds such as Lapix, Lunkerite, etc. For the past several years there had been considerable interest in these materials, but during the current meeting no one seemed inclined to talk much about them. About the only interesting observation was made by E. L. Ramsey, of Wisconsin Steel Co., who stated that he had used small amounts of some of these materials but for the most part found the use of oat hulls to be extremely satisfactory.

Construction and Operation of Basic Open Hearth Roofs

MUCH of the Wednesday afternoon Open Hearth Committee discussion was centered in basic open hearth roof construction and also checker design and performance. As regards the basic roof construction, much of the data were presented by H. S. Robertson, of Harbison-Walker Refractories Co. Mr. Robertson first pointed out that many questions have been asked relative to the application in Europe of basic refractories in the superstructure of open hearth furnaces, in particular the roofs. However, a somewhat different angle might be considered, as for instance the possible difference in the quality of the refractories as manufactured in this country and abroad, and the changes in construction of the open hearth furnace roof which operators have found necessary in adapting basic brick successfully.

It is generally accepted that a change in roof construction from the present conventional sprung arch design is necessary when using basic brick. This for several reasons, such as the greater weight of the basic brick as compared with silica, the fact that at the temperature of furnace operation, their crushing strength is less than silica brick, and the continual expansion and contraction of the brick from the temperature of charge to tap, and vice versa, differing as it does from the expansion of silica, presents a different problem.

According to Mr. Robertson, these factors have been fully taken into consideration by the full suspended roof which has been successfully adapted to high temperature furnaces (of larger area than the average open hearth) in copper reverberatory furnaces. The copper furnaces are over 100 ft. long by 28 ft. wide with roofs 12 to 18 in. thick, using basic brick metal encased, each individual brick being suspended. Through this construction the weight of the brick, any lack of strength at high temperatures, as well as expansion, are fully taken care of. Complete roofs so constructed have gone well over a year in continuous operation at temperatures at the hot end of from 2800 to 2900 deg. F., which life is four to five times the life of silica brick, in fact considerably longer where the operating conditions are severe.

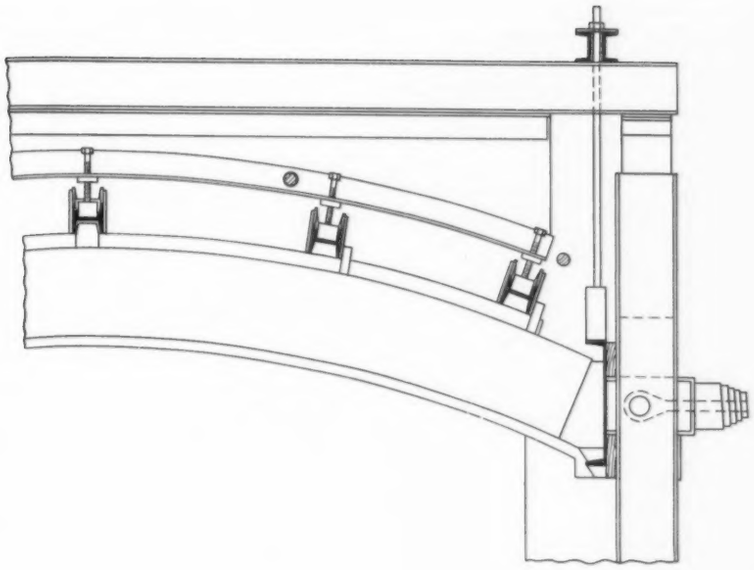
Although this type of roof could be considered equally applicable and meriting equal consideration in the open hearth along with any other design, the lines that have been followed in most of these furnaces abroad have provided for a somewhat different construction. In such construction the strains have been distributed over a greater area of brick by providing holding down members for the roof so that it will not rise when heated. As basic brick expand in proportion to the increase in temperature and the expansion on a roof is of course greater on the heated side of the brick than on the side exposed to the air, in a conventional sprung arch the greatest pressure falls on the inner section of the brick at the point where they are hottest and therefore the weakest. Holding the roof to a definite shape distributes the strain over a larger bearing surface. Naturally the entire roof must expand, and to provide for this expansion and the change in the angle of the skewback, the skewback channel is suspended from the top structural work and is not fastened to the buckstays. The back channel is held about 3 in. away from the buckstays by coil springs and is therefore free to move in a radius represented by the length of the supporting steel rods.

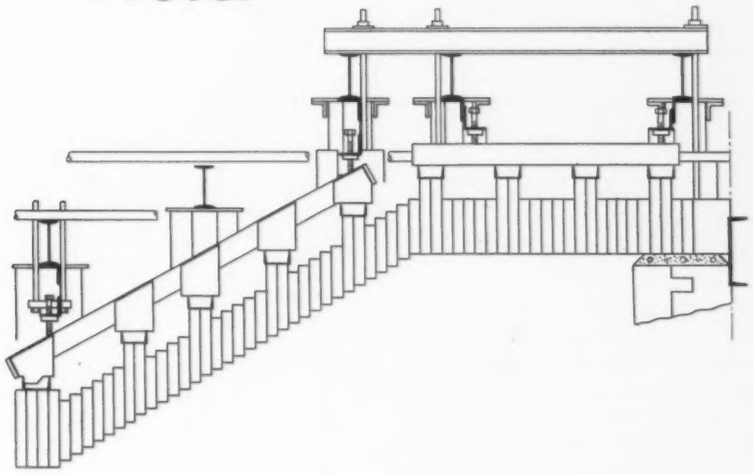
The construction of this type is shown in the accompanying drawings. Note that the roof bricks are keys rather than wedges and that steel is between every brick; in other words, simulating the Metalkase brick which is familiar in this country.

According to Mr. Robertson, the use of basic brick in the roofs has resulted in extending basic brick throughout the balance of the superstructure of the furnace and in the downtakes to the slag pocket arch. Also, economy can best be effected through increased and continuous production, and those operating open hearth furnaces abroad where such basic furnaces have proved economical by exceeding 1000 heats continuous operation, have found it necessary to provide for cleaning of the slag pockets during operation and likewise for cleaning the checkers. In other words, the use of a basic superstructure and roof would not always be economical if the furnace had to come down every three to six months to clean the slag pockets and remove, clean and replace checkers. Mr. Lindemuth, the open hearth consultant, has stated that on all basic uptake and roof there is less accumulation of slag in the slag pockets, and this being basic material of high refractoriness it can be scraped from the slag pockets as a lumpy material if this is done at periodic intervals of a few weeks and not allowed to remain too long.

According to reports, at least 50 per cent of the economy of the all-basic brick furnace where such has proved economical is a result of continuous operation, the balance to the saving of time through higher operating temperatures during the melting down period.

Mr. Robertson went on to say that the question of an all-basic brick open hearth is not one today of suitable brick but of redesigning of the present conventional sprung arch in the manner described, by some modification thereof, or by adopting the full suspended roof. Now, the limitations which prohibit the use of an entire basic roof made of sprung arches of the usual design, do not necessarily apply in the same way to narrow sections of basic brick combined with silica as now used successfully in some open hearth furnace roofs. This idea has been under experimentation in some 50 to 100 open hearth roofs over the past few years, having proved an economical practice in some and not in others. Judging from the data so far obtainable, according to Mr. Robertson, it will apparently ultimately prove economical in half of the open hearth





SKETCHES of roof construction used abroad with basic brick. Strains have been distributed over a greater area of brick by providing holding down members for the roof so that it will not rise when heated.

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roofs in the country and not in the other half, and that where it will prove economical it will of necessity be confined to a narrow section of not over 2 to 3 ft. wide adjacent to and including the back skewback. The economies here are of different values under different operating conditions.

After Mr. Robertson's report, a representative of the General Refractories Co. stated that in Canada a basic open hearth roof had passed through two years of continuous operation, which is much longer than is obtainable with a silica roof. He went on to state that a suspended basic roof cost about five times as much as a silica roof. However, the life of the first basic roof installed may not be five times that of a silica roof. The saving comes in when replacing an original basic roof, which brings the cost down, and also from the fact that the operator can look for economies in other directions through the use of basic roofs, as for instance increased production, less repair, etc. Nonetheless, it was pointed out that the use of basic roofs in this country will require careful attention and extensive experimentation.

As regards basic brick in other sections of the furnace, a representative of Jones & Laughlin reported that his company has basic brick along the back skewback and a basic patch along the roof. Both of these sections have stood up exceptionally well. The front walls of these furnaces are of basic brick also, and they never have had to be patched during a campaign. A. F. Franz, of Alan Wood, stated that he had used a patch 2 ft. wide by probably 6 ft. long over the tapping hole, which worked out very well. However, when the patch was extended to an area of about 4 x 20 ft. it buckled, and for that reason he no longer uses this practice. He did, however, express the opinion that basic brick is very satisfactory along the skewback and in the front wall. As regards experience with basic brick in the Armco plant, W. P. Albaugh, superintendent at Ashland, stated that large patches have buckled, but that smaller ones have performed admirably. Also, he agreed with the other operators in that basic front walls and basic brick along the skewback is extremely satisfactory.

Checker Design

Following the discussion of basic brick, attention was directed to checkers and particularly the performance of Loftus and Smalley checkers.

L. B. Luellen, superintendent at Inland, stated that he had used both types of checkers, and has gone six campaigns on Loftus checkers and two campaigns on Smalley checkers. Two furnaces were equipped with Loftus checkers and the performance of the checkers in the one furnace was excellent whereas in the other furnace the performance was poor. He also stated that in cleaning the Loftus checkers not as good a job is obtained as is desired. Using the Smalley checkers, two campaigns have been completed, one going 459 heats, with the checkers at the end being remarkably clean. On the second campaign, with 414 heats, the first three rows out from the bulkheads were partially clogged up, but nonetheless the furnace could have gone on to a longer campaign insofar as the checkers were concerned. The Smalley checkers are blown each two weeks, and it takes 24 man-hours of labor to do the job.

C. R. Fon Dersmith, of Armco, stated that he did not believe it wise practice to repair checkers at the end of a campaign, but rather that his com-

pany has found it advisable to relay all checkers for each campaign. This practice obviates draggy furnaces, and the fuel is kept down and speed up during the campaign.

It was agreed by everyone that pitch is a good fuel but that it is very severe on checkers. Usually, a furnace on pitch has to be taken off every 120 to 130 heats to clean and repair checkers, whereas the remainder of the furnace is in good condition and there is little or no slag in the pockets.

Discussion next shifted to experiences with dished chrome brick bottoms. A. M. Morton, of Pittsburgh Steel Co., stated that they have three furnaces with this type of bottom. It is believed that there is a saving in refractory material in making up the bottom and less trouble along the slag line. One bottom was laid up with Austrian magnesite and the other two with seawater magnesite. So far, the construction has been eminently satisfactory.

Use of Sinter in Blast Furnace Burdens

ONE interesting discussion in the Wednesday afternoon session of the Blast Furnace and Raw Materials Committee was that dealing with the use of sinter in blast furnace burdens. This question was dealt with in detail by Joseph H. Slater, of the Corrigan-McKinney plant of Republic Steel Corp.

Mr. Slater pointed out that there is nothing particularly new about the use of sinter in a blast furnace burden. For many years flue dust has been sintered at the various blast furnace plants to put it in a form that could be recharged to the furnace with some assurance that it would stay in the second time. What Mr. Slater had to say therefore, was not to be taken as a compilation of scientific data but rather an attempt to give Republic's experience with sinter.

Some years ago changes in sintering equipment were made, the result being a capacity of between 425 and 450 tons of sinter per day of the following material analysis:

Fe	*SiO_2*	*Phos.*	*Mn.*	*Al_2O_3*	*CaO*	*MgO*
57.80	12.10	0.096	0.98	2.01	2.08	0.20

Test No. 1

Duration = 31 days.
Coke analysis = 10.50 ash, 1.00 sulphur.
Wind blown = 45,000 cu.ft. per min.

	Furnace "A"	*Furnace "B"*
Sinter used	35 per cent of burden	None
Tons of iron produced	17,360	15,681
Coke per ton of iron	1,835 lb.	2,027 lb.
Scrap per ton of iron	None	None
Flue dust per ton of iron	170 lb.	217 lb.

Test No. 2

Duration = 30 days.
Wind blown = 46,500 cu.ft. per min.

	Furnace "A"	*Furnace "B"*
Sinter used	None	36 per cent of burden
Tons of iron produced	15,083	18,925
Coke per ton of iron	2,050 lb.	1,730 lb.
Scrap per ton of iron	None	None
Flue dust per ton of iron	97 lb.	91 lb.

Test No. 3

Duration = 30 days.

	Furnace "A"	*Furnace "B"*
Sinter used	23 per cent of burden	20 per cent of burden
Tons of iron produced	16,146	17,074
Coke per ton of iron	1,959 lb.	1,825 lb.
Scrap per ton of iron	None	None
Flue dust per ton of iron	112 lb.	90 lb.

It so happened that at that time there were two furnaces which were identical in every respect and both were operating on steel works iron. Both furnaces were blown with identical blowing equipment.

With these conditions it was quite natural to attempt to see what the effect would be of using a rather substantial percentage of sinter in a burden.

For no other reason than that it was closest to the sintering plant, therefore providing a shorter haul for the transfer car, "A" furnace was chosen to receive all of the sinter and "B" was to be operated on the regular ore mix.

From the above it will be seen that furnace "A" showed a tonnage increase of 1679 tons of pig iron with a reduction in coke practice of 192 lb. per ton. Furnace "A" made 42 lb. less flue dust per ton than furnace "B," which was rather a disappointment. The flue dust figure in each test represents total dust, i.e., dry dust plus gas washer sludge.

For the second test it was decided to switch burdens on the same furnaces, "A" getting no sinter and "B" having approximately the same as "A" had in the first test. However, it was five months later before the conditions right for a comparable run. Test No. 1 was conducted in January under rather bad weather conditions while test No. 2 was made under ideal weather conditions.

In this case furnace "B" produced 3842 tons more iron than furnace "A." It drove faster and operated much more smoothly. Coke practice was better by 320 lb., and flue dust, while much lower than in test No. 1, was practically the same for each furnace.

These results, according to Mr. Slater, showed rather conclusively that there was a very definite benefit to the furnace using sinter. It was decided to try one more experiment and split the 12,000 tons of sinter available between the two furnaces.

Furnace "B" had 2100 tons of roll scale in the burden while furnace "A" had none, which helps account for some of the apparent discrepancy above.

An advantage which Mr. Slater felt sure could be attributed to the use of sinter, but which does not show in these tests, is the greater smoothness of furnace operation and consequent better uniformity of iron quality.

On the strength of this experience, the sinter machine was rebuilt so that the capacity was 1000 tons per day.

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WITH the chairmen at the opening session of the open-hearth conference in Pittsburgh. L. F. Reinartz, of Armco, general chairman, is in the center; R. S. Bower, of Andrews Steel Co., chairman, is at the left; and J. T. Meell, of E. J. Lavino & Co., co-chairman, is at the right.

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With the greater tonnage of sinter available, various percentages of sinter were tried up to 75 per cent of the burden. The conclusion reached was that after the 50 per cent was passed, there was not a great deal of advantage other than the increased iron units in the sinter because the charge became so open that there does not obtain as intimate gas-solid contact. In other words, it appears that there can be too much of a good thing.

If there was a plant of five blast furnaces operating and sinter was available for 100 per cent in the burden of one furnace, or 20 per cent in each of the five, Mr. Slater said he would certainly choose the latter. Very apparent benefits in furnace operation begin to show at 20 per cent and continue up to 50 per cent, but beyond that there is a question as to the benefits.

Hot Metal Requirements For Today's Open Hearth

THURSDAY morning was devoted to a joint session of the Open Hearth and Blast Furnace Committees, and the problems discussed were those of mutual interest to the two groups. One of several valuable subjects touched upon was that of hot metal requirements of present-day open hearth operators, a subject which was dealt with in detail by Louis R. Berner of Inland Steel Co.

Mr. Berner pointed out that the hot metal that is required in Inland shops might be classed as an "all purpose" metal. It is primarily a high scrap-low hot metal plant, and a hot metal is desired which is believed to work the snappiest under the conditions where the proportion of scrap is maximum and where the proportion of hot metal is minimum. At the same time, a metal is desired which will do a reasonably good job in carrying to a final product, whether that product be spring, rail, forging, structural, strip, or pure iron.

The set-up being what it is, Inland compromises standards for one type of heat with standards for another type and finally arrives at a specification calling for 0.95 to 1.05 silicon, 1.80 to 1.95 manganese, sulphur 0.020 maximum, phosphorous 0.200 maximum, and copper 0.03 maximum.

Inland prefers 0.95 to 1.05 silicon in the hot metal for several reasons. In the first place, this closeness of range is desired in order to try to burden the open hearth furnaces with raw limestone to varying, but definite, lime-silica ratios, and naturally, the closer the range of silicon in the hot metal, the less will be the corrections called for. In the second place, it is believed that iron within the 0.95 to 1.05 silicon range will give the best day in and day out dependency of melt. While the open hearth operator will be very glad to take iron with the silicon range 15 points lower, experience has been that iron made to that range is generally physically cold. It is also too apt to occasionally fall too far below the 0.75 minimum set, and while it cannot be explained, there must be something within the inner workings of a blast furnace, or influences from without, that occasionally cause the open hearth enough trouble to throw things out of gear. A recent incident will illustrate this point, according to Mr. Berner:

One of the blast furnaces had been running on a very even keel. For five successive days prior to the incident the 24-hr. averages on this furnace ranged from 1.00 to 1.06 silicon. On the sixth day the 24-hr. average

dropped to 0.94 silicon and the last cast of the day went down to 0.77. A down swing had started and continued for 24 hr. Succeeding casts were as follows:

Silicon	*Sulphur*	*Manganese*	*Phosphorous*
1.01	0.025	1.85	0.155
0.80	0.031	1.80	0.150
0.75	0.031	1.71	0.152
0.78	0.031	1.60	0.152
0.52	0.038	1.48	0.147

The 24-hr. average being:

0.77	0.031	1.69	0.151

Corrections started in the open hearth by burdening heavier with hot metal but the condition finally caught up with the open hearth with the following results. Within the space of 6 hr., four out of five heats that finished from this metal were definitely off. Two of them had to be given extra metal to avoid sticker melts. Three of the four could not make the heats for which they were charged. The two getting extra metal could not be applied on particular orders scheduled for the mill. The mill, in turn, had to move to other orders with additional roll changes and delays as the consequence. The delay to the open hearth in finally getting these heats out of the furnaces amounted to an average of 1 hr. 41 min. per heat. Thus, the blast furnace swing proved costly in several directions.

Inland chose 1.80 to 1.95 manganese because it was found that range necessary to good active metal in the furnaces, giving speed of melt and reasonably high residuals in the finishing period of the heats.

The open hearth asked for a maximum of 0.200 phosphorous because much above that forces an increase in limestone charge to avoid phosphorous reversion during the deoxidation period of the forging quality heats. Heavy limestone charges, of course, mean longer time of heats and highly oxidizing slags. The open hearth is anxious to avoid the first item for the sake of costs and the second item for the sake of quality.

The open hearth asks for sulphur and copper to be held to the absolute minimum because these are essential if there is to be delivered to the mill ingots which will roll into sheets of maximum drawing quality.

If the blast furnace, for instance, gives 0.030 sulphur, it is necessary to charge additional limestone and drive the furnaces harder in order to finish below the maximum set for the open hearth. This, in the end, means higher fuel costs, more wear and tear on bottoms, as well as higher refractory costs.

Use of Carbanalyzer; The Leeka Process for Carbon Determination

CONSIDERABLE interest was developed in the Friday afternoon session of the Open Hearth Committee in the use of the Carbanalyzer. W. S. Wright, of Jones & Laughlin, stated that his company had used the Carbanalyzer since the first of the year and now has three in the shop. The Carbonometer is no longer used. For the Carbanalyzer, it was stated that operators prefer its use because of the simplicity of operation; the instrument does not have to be changed from high to low for various determinations, and accuracy in carbon percentage is easily within one point either way. The instrument is used for tapping carbons, and it is no longer necessary to send samples to the laboratory for checking. The equipment is portable, and can be used anywhere inasmuch as heat or cold has no effect on it.

R. F. Scholl, of Bethlehem Steel Co., stated that his company now has a Carbanalyzer in use on basic steel, and that the results so far check very close with those of the Carbonometer. It was pointed out that in obtaining carbon percentages with the Carbanalyzer, it is necessary to take into consideration the effect of nickel and molybdenum.

E. D. Buchanan, of The Armco Butler plant, stated that he has used the Carbanalyzer for several months. The instrument was at first erratic, but later the various factors involved in taking a test were standardized and from then on the results were satisfactory. In a test run of 42 tests on high carbon steel (around 0.75 C) the variation from laboratory check tests was at the most one point, and lately several heats have been tapped without the use of the laboratory at all.

A question was asked as to whether one reading may be found for a sample after which another reading of a point or so difference may be found after the sample is turned through 180 deg. And, if so, which reading is used. The answer to this was that such a variation may or may not be obtained. If the test sample is not straight or if it has fins down the side, then a point or so variation on turning may result. The solution to this difficulty is to be sure the sample is straight, and also to carefully remove all the fins. Another fine point in operation is to insert the sample in the machine so that the portion from which the fin has been removed is in the same place in each instance. One operator said that if all these precautions are taken then the results obtained would vary within one-half point of laboratory determinations. To obtain full accurate use of the Carbanalyzer it is imperative to take the samples properly and chill them properly and to read the scale carefully.

The next question considered was the Leeka process for determining combustion carbons and residual manganese. There was little discussion regarding this other than that presented by F. M. Washburn of Wisconsin Steel Co. Mr. Washburn stated that his company had used the Leeka process since last September for both preliminary and final carbons in the open hearth. The time consumed for a test is 3½ min., the results are not affected by residuals, and the operation in general is quite satisfactory.

Financial Notes

Keystone Steel & Wire Co., Peoria, Ill., reported net profit for the three months ended March 31 of $279,385, compared with a profit of $317,608 in the same quarter a year ago.

Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., earned $218,772 in the March quarter compared with $1,250 in the corresponding period last year.

Wheeling Steel Corp., Wheeling, W. Va., reports earnings for the quarter ended March 31 of $644,652, equal to 29c. a share on common stock after allowing for the regular dividend on the 5 and 6 per cent preferred stock. This compares with a net profit of $728,661 for the corresponding 1939 period.

Superior Steel Corp., Pittsburgh, earned a net profit of $84,009 in the first three months of this year, compared with a net loss of $6,733 in the corresponding 1939 period. Net sales totaled $1,933,842, against $1,290,828 in the first quarter of 1939, according to N. K. Schaller, secretary-treasurer, who also stated that operating profit, after costs, selling and general expenses, amounted to $199,406.

A. M. Byers Co., Pittsburgh, reports a net profit of $65,307 for the first quarter of 1940, equal to $1.15 a share after all charges, compared with net profit of $241,757 or 53c. a common share, in the preceding quarter and $122,998, or 9c. a share, in the March, 1939, period. For 12 months ended March 31, the company reports net profit of $766,914 equal, after preferred dividend requirements, to $1.39 a share, compared with a loss of $54,980 in the 12 months ended March 31, 1939.

Current Metal Working Activity

Latest Data Assembled by THE IRON AGE from Recognized Sources

	March 1940	February 1940	February 1939	2 Months 1940	2 Months 1939
Steel Ingots: (net tons)					
Monthly output[a]	4,236,050	4,374,625	3,347,288	9,994,323	6,902,562
Average weekly output[a]	956,219	1,056,673	836,822	1,166,198	818,809
Per cent of capacity[a]	63.0	69.62	56.30	76.83	53.54
Pig Iron: (net tons)					
Monthly output[b]	3,270,499	3,311,480	2,307,409	7,343,502	4,743,883
Raw Materials: (gross tons)					
Coke output[c] (net tons)	4,259,848	4,172,042	3,148,754	9,117,410	6,593,010
Lake ore consumed[d]	4,087,767	4,241,839	2,852,540	9,531,147	5,779,246
Scrap iron and steel consumed[r]	2,932,000	3,054,000	2,313,000	6,829,000	4,808,000
Castings: (net tons)					
Malleable, orders[e]		34,901	33,234	75,339	71,339
Steel, orders[e]		40,913	31,223	84,034	74,195
Finished Steel: (net tons)					
Trackwork shipments[a]	8,446	6,898	4,250	13,660	7,159
Fabricated shape orders[f]	127,731	92,526	82,719	171,355	184,431
Fabricated plate orders[e]		25,824	22,903	59,628	43,414
U. S. Steel Corp. shipments[g]	931,905	1,009,256	747,427	2,154,848	1,618,293
Fabricated Products:					
Automobile production[h]	439,911	421,820	317,520	871,134	674,482
Steel furniture shipments[e]	6,951,902	$2,263,969	$1,748,184	$4,527,602	$3,530,975
Steel boiler orders[e] (sq. ft.)	760,668	558,108	817,347	1,083,400	1,947,959
Locomotives ordered[i]	40	18	3	46	11
Freight cars ordered[i]	1,076	1,172	2,004	1,381	2,007
Machine tool index[j]	93.4	92.9	56.1	93.1	54.3
Foundry equipment index[k]	243.4	179.4	135.3	180.9†	133.3†
Non-Ferrous Metals: (net tons, U. S. only)					
Lead shipments[l]	46,353	39,176	30,135	79,051	65,058
Lead stocks[l]	74,692	72,658	138,134		
Zinc shipments[m]	51,095	53,048	45,291	161,694	127,758
Zinc stocks[m]	73,611	67,086	127,985		
Tin deliveries[n] (gross tons)	9,244	6,600	4,105	16,380	8,435
Refined copper deliveries[o]	71,893	72,809	51,577	177,354	*
Refined copper stocks[o]	159,795	145,393	309,119		
Exports: (gross tons)					
Total iron and steel[p]		671,301	359,690	1,254,822	722,362
All rolled and finished steel[p]		315,263	110,766	608,619	218,318
Semi-finished steel[p]		84,876	14,472	163,508	29,914
Scrap[p]		232,800	222,704	418,453	448,138
Imports: (gross tons)					
Total iron and steel[p]		6,740	19,149	15,014	46,813
Pig iron[p]		2,032	603	3,946	1,189
All rolled and finished steel[p]		1,921	10,149	3,685	28,764

† Three months' average. * Not available. †† Preliminary.

Source of data: [a] American Iron and Steel Institute; [b] THE IRON AGE; [c] Bureau of Mines; [d] Lake Superior Iron Ore Association; [e] Bureau of the Census; [f] American Institute of Steel Construction; [g] United States Steel Corp.; [h] Preliminary figures from Ward's Automotive Reports—Final figures from Bureau of the Census, U. S. and Canada; [i] *Railway Age*; [k] Foundry Equipment Manufacturers Association; [l] American Bureau of Metal Statistics; [m] American Zinc Institute; [n] New York Commodity Exchange; [o] Copper Institute; [p] Department of Commerce; [r] Institute of Scrap Iron and Steel.

Research and Practice Problems S

HENRY S. WASHBURN, Plainville Casting Co., Plainville, Conn., national president of American Foundrymen's Association.

OVER the coming week end, thousands of foundrymen from all parts of the United States and Canada will embark upon their annual spring pilgrimage. This year their faces are turned toward Chicago, Mecca of the American foundry industry and host to the 44th annual convention of the American Foundrymen's Association.

Awaiting the foundrymen at Chicago is an elaborate program of technical sessions, committee meetings and social affairs, topped off with one of the largest exhibits of foundry equipment and supplies ever sponsored by the association.

The equipment exhibit, housed at the International Amphitheatre, will open on May 4. Some 250 individual exhibits will be on display,

GRAY IRON

Monday

11:00 A.M.—Cupola operation shop course, session 1.
Chairman, P. T. Bancroft, Moline, Ill.
Discussion leader, John Grennan, University of Michigan, Ann Arbor, Mich.

Tuesday

4:00 P.M.—Cupola practice shop course, session 2.
Chairman, Horace Deane, American Brake Shoe & Foundry Co., Mahwah, N. J.
Discussion leader, Donald J. Reese, International Nickel Co., New York.

Wednesday

8:30 A.M.—Sand shop course, session 2.
Chairman, E. E. Woodliff, Harry W. Dietert Co., Detroit.
Discussion leaders, Frank Brewster, Baker Perkins Co., and Charles Schofield, Chevrolet Motor Co., Saginaw, Mich.
2:00 P.M.—Sand Research. *Effect of Sand on Properties of Cast Iron,* by H. W. Dietert and E. E. Woodliff, Harry W. Dietert Co., Detroit.
Effect of Sand on Properties of Cast Iron, by H. Womochel and C. C. Sigerfoos, Michigan State College, East Lansing, Mich.
4:00 P.M.—Shop Course, session 3.
Chairman, V. A. Crosby, Climax Molybdenum Co., Detroit.
Cupola Control by Gas Control, by S. C. Massari, Association of Manufacturers of Chilled Car Wheels, Chicago.

Thursday

10:00 A.M.—Sand Research.
Recent Experiments with Gray Iron Synthetic Molding Sands, by Fulton Holtby and Herbert Scobie, University of Minnesota, Minneapolis.
12:30 P.M.—Round Table Luncheon.
Presiding, G. P. Phillips, International Harvester Co., Chicago.
2:00 P.M.
Chairman, G. P. Phillips, International Harvester Co., Chicago.
Co-Chairman, W. H. Spencer, Wilkening Mfg. Co., Philadelphia.
Effects of Sulphur on Properties of Electric Furnace Cast Irons, by Fulton Holtby and R. L. Dowdell, University of Minnesota, Minneapolis.
Effect of Varying the Silicon Content of Cast Iron, by F. G. Sefing, International Nickel Co., New York.
Desulphurization of Cast Iron from Practical Operating Standpoint, by W. Levi, Lynchburg Foundry Co., Radford, Va.
4:00 P.M.—Shop Course.
Chairman, John Grennan, University of Michigan, Ann Arbor, Mich.
Ladle Additions of Graphite to Cast Iron, by A. H. Dierker, Ohio State University, Columbus, O.

Friday

10:00 A.M.
Chairman, H. Bornstein, Deere & Co., Moline, Ill.
Co-Chairman, A. L. Boegehold, General Motors Research Laboratories, Detroit.
The Damping Capacity, Electric and Thermal Conductivities and Endurance Properties of Some Gray Irons, by C. H. Lorig and V. H. Schnee, Battelle Memorial Institute, Columbus, O.
Cast Iron Cylinder Bores—Observations on Microstructure, Composition, Hardness and Wear, by E. K. Smith, Electro Metallurgical Co., Detroit.
Tendency of Some Cast Irons to Seize Under Sliding Friction, by A. H. Dierker, Ohio State University, Columbus, O.
Report of Coke Specifications Proposal for ASTM, by B. P. Mulcahy, Citizens Gas & Coke Utility, Indianapolis.
2:00 P.M.
Chairman, S. C. Massari, Association of Manufacturers of Chilled Car Wheels, Chicago.
Co-Chairman, F. J. Walls, International Nickel Co., Detroit.
Pearlitic Interval in Gray Iron, by Alfred Boyles, Battelle Memorial Institute, Columbus, O.
Formation of Various Types of Graphite Patterns in Gray Cast Iron, by C. D'Amico, and R. Schneidewind, University of Michigan, Ann Arbor, Mich.
Effects of Boron on Cast Iron, by G. M. Cover, Case School of Applied Science, Cleveland.

NON-FERROUS

Tuesday

9:00 A.M.—Sand Shop Course.
Chairman, D. Frank O'Connor, Walworth Co., S. Boston, Mass.
Discussion leader, Donald May, Crane Co., Chicago.
10:00 A.M.
Chairman, Wm. J. Laird, Westinghouse Electric & Mfg. Co., E. Pittsburgh.
Co-Chairman, R. W. Parsons, Ohio Brass Co., Mansfield, O.
Procedure to Obtain Maximum Physical Properties in Melting a Given Alloy, by Wm. B. George, R. Lavin & Sons, Chicago.
Improvements in Gas Melting Furnaces in Non-Ferrous Foundry, by E. W. Williams, Equitable Gas Co., Pittsburgh.
2:00 P.M.

ms Stressed in A. F. A. Program

LESTER N. SHANNON, Stockham Pipe & Fittings Co., Birmingham, national vice-president of American Foundrymen's Association.

many in operation, illustrating new developments in foundry equipment and supplies. The technical session will get underway Monday morning, May 6. The annual business meeting is scheduled for the morning of May 8. A feature of this meeting will be the annual Board of Awards address, to be delivered this year by C. E. Wilson, executive vice-president, General Motors Co. Mr. Wilson will discuss public relations. Presentation of Board of Awards medals will also take place at this meeting. Another keenly anticipated feature of the convention is the annual dinner, scheduled for the evening of May 9. The complete schedule of sessions planned for the convention, arranged as to subject matter, follows:

Chairman, Harold J. Roast, Canadian Bronze Co., Montreal, Que., Canada.
Co-Chairman, Wm. Romanoff, H. Kramer & Co., Chicago.
Non-Ferrous Applications of Top Pouring Methods, by A. K. Higgins, Allis-Chalmers Mfg. Co., Milwaukee.
Tentatively Recommended Practice on Sand Cast Bronze, Red Brasses and Semi-Red Brasses.
Non-Ferrous Division Annual Business Meeting.
Reports of Officers and Committees.

Wednesday

12:30 P.M.—Round Table Luncheon.
Presiding, C. O. Thieme, H. Kramer & Co., Chicago.
Discussion Subject — *Metal Covers, Fluxes, Deoxidizers and Degasifier Practice.*
7:00 P.M.—Non-Ferrous Division Annual Dinner.
Presiding, Division Chairman Harold J. Roast, Canadian Bronze Co., Montreal, Quebec.

MALLEABLE

Tuesday

10:00 A.M.
Chairman, C. C. Lawson, Wagner Malleable Iron Co., Decatur, Ill.
Co-Chairman, D. P. Forbes, Gunite Foundries Corp., Rockford, Ill.
Composite Molding in a Malleable Foundry, by Sam Healy, Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich.
An Unusual Structure in Malleable Iron, by Enrique Touceda, Malleable Founders' Society, Albany, N. Y.
A Sand Control Program in a Malleable Foundry, by D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn.
2:00 P.M.
Chairman, R. J. Anderson, Belle City Malleable Iron Co., Racine, Wis.
Co-Chairman, D. I. Dobson, General Malleable Corp., Waukesha, Wis.
Effects of Manganese in Second Stage Graphitization, by D. P. Forbes, P. A. Paulson, and G. K. Minert, Gunite Foundries Corp., Rockford, Ill.
Heat Treatment of Malleable Iron, by R. J. Cowan, Surface Combustion Corp., Toledo.

Wednesday

8:30 A.M.—Sand Shop Course.
Chairman, E. E. Woodliff, Harry W. Dietert Co., Detroit.
Discussion leaders, Frank Brewster, Baker Perkins Co., and Charles Schofield, Chevrolet Motor Co., Gray Iron Foundry, Saginaw, Mich.
12:30 P.M.—Round Table Luncheon.
Chairman, A. M. Fulton, Northern Malleable Iron Co., Minneapolis.
Co-Chairmen, P. C. DeBruyne, Moline Malleable Iron Co., St. Charles, Ill., and J. H. Lansing, Malleable Founders' Society, Cleveland.

STEEL

Thursday

10:00 A.M.
Chairman, T. N. Armstrong, International Nickel Co., New York.
Co-Chairman, H. M. Rishel, American Steel Foundries, Granite City, Ill.
Application of External Chills, by W. F. McKee, Key Co., E. St. Louis.
Committee Reports.
2:00 P.M.
Chairman, H. D. Phillips, Lebanon Steel Foundry, Lebanon, Pa.
Co-Chairman, R. A. Gezelius, General Steel Castings Corp., Eddystone, Pa.
Effects of Welding on the Structures of Some Cast and Wrought Steels, Presented by Lunkenheimer Co., Metallurgical Division, Per A. J. Smith and J. W. Bolton, Cincinnati.
Chaplets in Steel Castings, by H. F. Taylor and E. A. Rominski, Naval Research Laboratory, Anacostia Station, Washington.

Friday

9:00 A.M.—Sand Shop Course.
Chairman and Discussion leader, L. H. Hahn, Sivyer Steel Casting Co., Chicago.
Discussion leader, D. D. Cameron, Chicago Heights, Ill.
10:00 A.M.
Chairman, F. A. Melmoth, Detroit Steel Castings Co., Detroit.
Co-Chairman, D. C. Zuege, Sivyer Steel Casting Co., Milwaukee.
Application of Controlled Directional Solidification to Large Steel Castings, by J. A. Duma and S. W. Brinson, Norfolk Navy Yard, Norfolk, Va.
12:30 P.M.—Round Table Luncheon.
Chairman, A. H. Jameson, Malleable Iron Fittings Co., Branford, Conn.
Co-Chairman, John Howe Hall, Philadelphia.

APPRENTICE TRAINING

Tuesday—10:00 A. M.

Chairman, C. R. Culling, Carondelet Foundry Co., St. Louis.
Co-Chairman, C. J. Freund, Dean of Engineering, University of Detroit, Detroit.
An Adaptable Apprentice Program, by A. L. Armantrout,
(CONCLUDED ON PAGE 116)

THIS WEEK ON THE ASSEMBLY LINE

By W. F. SHERMAN
Detroit Editor

. . . Fruehauf builds stainless steel trailers using Budd shotweld process . . . Auto output drifts downward to 101,405 . . . Foreign sales drop; Canadian output rises . . . Ford six-cylinder model hangs in balance, apparently shelved.

DETROIT — Inaugurating the production of stainless steel truck trailers made by the Budd shotweld process, Fruehauf Trailer Co. last week opened its enlarged plant to visitors who were permitted to view the assembly of the first of the new line of light-weight units for highway transportation. It would not be surprising to find, as Harvey C. Fruehauf, president, has said, that vehicles of this type (including trucks and buses) eventually will become the largest users of premium materials such as stainless. The Budd type trailers, which save upward of half a ton dead weight compared with conventional steel construction, are to be manufactured by Fruehauf in plants at Detroit, Kansas City and Los Angeles on progressive assembly lines at rates which would have been surprising a few years ago. An initial lot of 1000 trailers has been scheduled, with output of the Detroit plant to be 12 to 16 trailers on each 8-hr. shift. The two Western plants are scheduled for four to five trailers a day.

Of course, the explanation for the trailer industry's ability to use material costing upward of $600 a ton is the fact that each pound savings in deadweight increases capacity to carry payload proportionately. The Fruehauf company, now in its 26th year and operated by three sons of the founder, still sticks to the fundamental idea that "a horse can pull more than it can carry." The first vehicles produced by the company were called "modern wagons" and were, in fact, just wagons designed for use with motor trucks. The idea is that a truck, like a horse, can pull many times as much as it can carry.

The new stainless steel trailer bodies were originally developed by Budd at its Philadelphia plant. The licensing of Fruehauf to use this type of construction also marks Budd's exit from the trailer-building field. Stainless steel "sets" are being fabricated by Budd at Philadelphia and assembled and welded in the Fruehauf plants. The material is 18-8, corrugated and formed over rectangular tubing and special formed shapes which constitute the welded framework. Initial requirements, it is reported, exceeded 2000 tons of stainless. Representatives of the highway transportation field took advantage of the ceremonial luncheon to call attention to another economic fact about the trucking industry which was recently reported by the former Federal Coordinator of Transportation. This official, Joseph B. Eastman, now chairman of the Interstate Commerce Commission, has called attention to the fact that the highway hauling industry, apparently alone in the transportation field, operates wholly without subsidy.

The Fruehauf company itself has expanded several times in the last three years and, coincident with the announcement of the new trailer, started construction of a three-story addition to its main office building in Detroit. It has just completed a $300,000 body plant in which the stainless trailers are being assembled. The main plant now occupies over 25 acres of ground and has 500,000 sq. ft. of manufacturing floor space.

Production Slightly Downward

Automobile production registered a slight but not yet significant downward drift last week. Output was reduced to 101,405 passenger cars and trucks, compared with 103,725 in the previous week and 86,640 in the corresponding week of last year, according to Ward's Automotive Reports. This statistical report indicated that the approach of the month-end has brought an attempt to balance factory schedules to field stocks. However, the industry is at the end of the period when any increases in production can be looked for. Already the industry has produced 300,000 vehicles more since Jan. 1 than it did in the first four months of last year, the total now being 1,719,780.

Factory sales of 1,259,027 vehicles in the first quarter have been reported by the Department of Commerce. This total is higher than during any corresponding three months since 1929. Of the total, 1,052,581 were passenger cars and 206,446 were commercial cars, trucks and tractors.

Disturbed conditions abroad are reflected in figures for foreign markets, according to the Commerce Department. There has been a falling off in sales of both passenger cars and commercial vehicles. Passenger car units dropped from 58,895 in the first quarter of 1939 to 37,637 in the first quarter of this year. Foreign sales of commercial vehicles were 38,790, against 41,944 a year ago. Canadian output has been stepped up, largely, it is believed, as a result of war demand, from 46,643 in the first quarter of 1939 to 52,018 in the first quarter of 1940. Both passenger and commercial cars were produced in larger volume this year in Canada.

Ford Program Changed

Detroit has watched progress on the Ford six-cylinder program with many questions about whether "this one will go through." Frequent mention has been made of the "44" model with the huge main bearings equivalent in diameter to a circle through which the whole crankshaft could be passed—and to other Ford projects which have died after they seemed certain to see the light of day.

Now it is stated that the Ford Six engine design has been shelved and that engineers are working "with a clean sheet of paper." Curiously no machine tools on order have been cancelled but everything has been held up, particularly tooling. One rumor has it

ACCURACY

cuts the cost of cold

REMEMBER, just a stone's throw back in time, when the first electric refrigerators hit the market? Like freight cars, they were . . . huge and expensive. Look at today's—twice the efficiency at one-third the price. Next year they'll be even better . . . even cheaper. Accuracy makes the difference . . . accuracy in manufacture that permits shaping and cutting and fitting to ten-thousandths of an inch . . . accuracy that inevitably creates a richer life for all people.

Accuracy at Pratt & Whitney is no mere word, but a *creed* . . . a great ideal established by the founders at the outset of the company eighty years ago. It is a living, vital thing to over 2600 skilled Pratt & Whitney craftsmen today. The incredibly accurate machine tools, cutting tools, and precision gages which leave the immense new Pratt & Whitney plant day by day transmit this accuracy to the machines they produce. When you buy, investigate Pratt & Whitney precision equipment. It pays big dividends.

PRATT & WHITNEY

Division **Niles-Bement-Pond Company · West Hartford, Connecticut, U. S. A.**

A REVOLUTION in the highway hauling industry is underway with widespread interest generated by successful use of light-weight, high-strength materials for vehicles. Manufacture of the first stainless steel trailer by Fruehauf Trailer Co., Detroit, was started last week with ceremonies which brought together a number of notable figures in the highway transportation industry. Fruehauf officials photographed at the final assembly line are, left to right, JOHN W. VOTYPKA, chief engineer; HARRY R. FRUEHAUF, vice-president in charge of manufacture; ROY A. FRUEHAUF, vice-president in charge of sales; A. L. STRUBLE, general sales manager.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

that only the size of the engine block will be changed, but that is offset by convincing evidence that the whole engine program has been stopped. The body program seems still to be alive, and parts of the chassis seem to be unaffected. In some quarters this has led to the guess that the proposed new design might come out with V-60 engine installations. This would give a design different in appearance from the V-85 models, lighter and with better performance than the present V-60. However, the most that can be said for sure is that work has been held up, for how long nobody knows. Ford men have been sworn to secrecy, and the matter seems likely to rest there pending further developments.

Steel Buyers Not Excited

Following reinstatement of original second-quarter prices for steel, there was little excitement or activity among steel buyers or sellers late last week. While some sources indicated that orders at bargain prices placed before the May 1 deadline on low prices must be specified by June 1, for delivery by June 30, others said that the question of final date for *specifications* had not yet arisen. However, it is a matter of general knowledge that steel for 1941 models cannot be specified, except for die tryouts, within the time limit set. If the reaffirmed prices prevail at all through the summer months, this should insure that all 1941 tonnage will bring the full price. In other words, the "bargain days" that ended May 1, will have meant little in terms of tonnage.

Industrial Diamonds Scarce

Wartime restrictions on industrial diamonds are proving to be something of a handicap, according to the purchasing department at Pontiac, which buys nearly a pound of diamonds a year. Suppliers report that British South Africa supplies can only reach the United States by Clipper plane. So far, there has been no actual shortage because American brokers laid in large supplies last September, and so far the price has not been seriously affected. At Pontiac, it is reported, however, that the threat of scarcity has increased the use of tungsten carbides.

Buick and some other General Motors cars are considered to be prospective users of new powdered metal bearings which have been developed by Moraine Products Division at Dayton. The bearing has a backing of steel strip to which is bonded a mixture of fine copper and nickel powder by a sintering operation. The final bearing

surface is a thin layer of babbitt. The bearings are one of the most interesting of the recent developments in the art of powdered metallurgy. Buick released the design and specifications for use nearly nine months ago, and adoption has hinged upon the tooling up of the Dayton plant.

Tool Steel Price Stability Aided Industry, Firth Says

McKEESPORT, Pa.—Had a price scare been added to the feeling of concern regarding tool steel last fall following the outbreak of the European war, the inventory situation would now be such that the present operating rate of the industry would be appreciably below the current level of 60 per cent, L. Gerald Firth, president, Firth-Sterling Steel Co. here, said last week.

Mr. Firth, who indicated that the tool steel industry is benefiting by its refusal to increase prices during last fall's sudden upsurge in demand, said that this action has been a factor in stemming the industry's downward trend in business which began early this year.

Mr. Firth, whose company announced last Nov. 13 that it would maintain the 67c. a lb. price on high-speed tool steel throughout 1940, stated that operation at his plants struck a parallel with consumption by April 1, thus suggesting a favorable inventory situation which he said was a result of a tool steel industry's action in not raising prices last fall.

G-M Honors 25-Yr. Workers At Hyatt Plant, Where Sloan Started in 1897

RETURNING to the plant where 43 years ago he started his business career as a draftsman, Alfred P. Sloan, Jr., chairman, General Motors Corp., on April 26 attended a celebration honoring employees who have worked for the Hyatt Bearings division for more than 25 years.

Mr. Sloan talked with men who were his fellow employees two or three decades ago. Among the things he saw was the desk at which he worked a quarter of a century back. The celebration culminated with a dinner at the Newark, (N. J.) Athletic Club where each of the 70 25-year employees were presented with an inscribed gold watch. Oldest employee in point of service was Jacob Cless, 63, who joined Hyatt in 1906.

THIS WEEK IN WASHINGTON

. . . TNEC told farm mechanization has cut production costs, reduced hours of work . . . Broad revisions of Wagner Act now seen unlikely . . . New Deal agencies endangered by Logan-Walter Bill.

o o o

By L. W. MOFFETT
The Iron Age

o o o

WASHINGTON—The Temporary National Economic Committee, concluding the third and final week of hearings in its study of technological developments, received testimony last week from Fowler McCormick, second vice-president of the International Harvester Co., that farm mechanization has lowered production costs, decreased hours of work for farmers, improved rural educational facilities and contributed substantially to a more attractive farm life.

Mr. McCormick, whose grandfather invented the reaper in 1831, minimized the extent of labor displacement through the development and use of farm machinery, and urged the committee to draw a distinction between labor saving and labor displacing in appraising the effects of farm machinery.

"At the present time, however, and looking ahead," the witness continued, "I believe it can be said with some assurance that the tendency is to shorten the hours of the workers on the farm rather than to decrease their number. . . . While stressing the major effects of farm machinery and shortening hours, I do not mean to imply that farm machinery has brought about no recent labor displacements. No doubt it has brought about such displacements but not, I think, to any such extent which has occurred in industry."

Most Are Family Farms

Mr. McCormick told the committee the extent of labor displacement by farm machinery is sometimes exaggerated by confusion with other causes and that an important fact to keep in mind is that a great majority of the 2,800,000 farms in this country are family farms without hired help — farms where "no labor displacements occur because the farmers do not fire themselves or their children" when working time is reduced. This group, he explained, constitutes the great market for which the newer and smaller tractors and implements are being made and on which the farm equipment industry is pinning its hopes.

Because most of the tractors were in use on larger farms in the 1920 decade, the "dire prophecies" were made that farm mechanization would lead to corporate farming and the elimination of the family farm. On the contrary, Mr. McCormick added, the development and production of the one-plow tractor and all of the small-tool equipment to go with it, reflects the determination of the family-sized farmer to remain in business and his desire to share in the benefits of mechanizations. The witness said that without such a demand manufacturers would not have been able to design, produce and market the small tractor and the necessary tools.

Government Backs Mechanization

He characterized the mechanization of farming in this country as "a foremost factor" in assuring an adequate food supply and expressed the view that the American type of high-volume, low-cost industry could not have developed with a backward, underpowered agriculture. He reminded the committee that the Federal government itself, through the Rural Electrification Administration, had embarked on a program to extend mechanization on the farm by making available a new source of power.

After outlining the history of farming, the demand for labor saving machinery, the organization of the farm equipment industry, the witness listed the following needs, for which he said no satisfactory commercial machines have been developed: Mechanical assistance for the sugar beet crop; a corn combine; sugar cane harvester; and mechanical cotton picker.

On the basis of past developments, Mr. McCormick forecast that continued progress will be made in the application of mechanical power to farming.

"I believe the changes will be gradual, as all changes in agriculture are," he continued. "I believe that they will come in response to the changing needs of the farm population. I believe that they will have the same objectives as before — to increase the farmer's income and improve his way of living. I am convinced that the pronounced trend toward smaller machines will continue and that the end result will be to improve the position of the family-sized farm which has always been held as the ideal basis for American farming."

At the request of Dr. H. Dewey Anderson, TNEC economic consultant, Mr. McCormick submitted for the record a sketch of the farm equipment industry, explaining the past trend toward consolidations, the tendency to broaden the line of products and the necessity for maintaining wholesale branch sales houses.

Charts, Price List Presented

Also listed were the eight so-called "long line" companies in the industry, which were subjected to a two-year investigation completed by the Federal Trade Commission in June, 1938. As a result of the $150,000 inquiry, which was prompted by an anti-monopoly bloc in Congress who charged that farm machinery prices were maintained at high levels during the depression, the FTC complained at that time that the bulk of production was concentrated in a relatively small number of manufacturers.

Also given the TNEC was a chart prepared by the Farm Equipment Institute comparing 1913 and 1937 prices of 25 typical farm machines and 38 other manufactured products commonly purchased by farmers. Mr. McCormick pointed out that the chart brings "the surprising dispersion" in the relative price changes of the various machines and products since 1913 —a fact which he said is "submerged in the combined price indexes usually published."

The price indexes submitted, which did not take into account changes and

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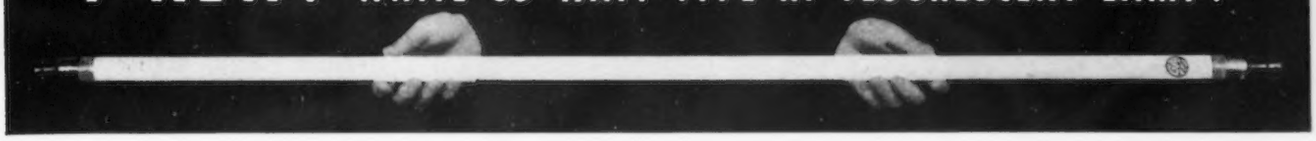

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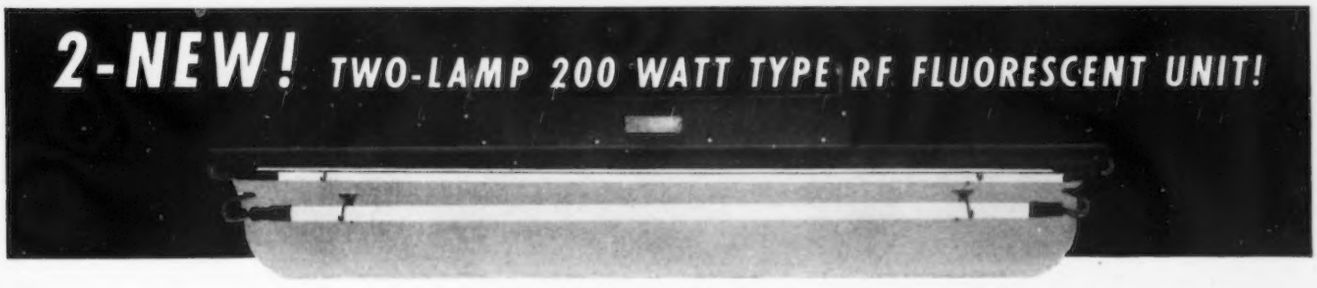

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improvements in products, indicated that whereas prices had increased 110 per cent for disk harrows, 100 per cent for sulky rakes, and 99 per cent for mowers, prices for two, three, and four-plow tractors had decreased about 30 per cent; harvester-thresher combines, down 25 per cent; and engines down 12 per cent. Other price comparisons showed that bituminous coal had increased 158 per cent; wage rates up 133 per cent.

Speaking generally, Mr. McCormick said the great variations in the 1937 price indexes reflected the increased wage rates and material costs less the varied cost reductions achieved since 1913 plus the cost of quality-efficiency improvements.

4.9% for Equipment

Citing Department of Agriculture figures, the witness told the committee that out of a gross farm income of $9,100,000,000 in 1939, farmers spent $422,000,000 for farm implements, tractors and repairs, or about 4.9 per cent. This compared to an income of $10,425,000,000 in 1937 when expenditures for farm implements totaled $585,000,000 or 5.6 per cent of the farm income.

Earlier in the hearings, experts from the Department of Agriculture testified that technological advances have created and are still creating unemployment in the farming industry and that the trend promises to continue. Louis Bean, economist for the Bureau of Agricultural Economics, declared that in 1939 the 32,000,000 persons living on farms in this country were able to supply the needs of 50 to 70 per cent more urban dwellers than the same number of farm people supplied 30 years before. Contributing largely to the change, he told the committee, were the corn picker, the motor truck, the large and small all-purpose tractors and other farm equipment.

William Green, president of the AFL, asserted that the current technological rate of displacement of labor is large and that out of a 3,000,000 difference in 1939 and 1929 employment figures a large number of employees have been displaced by increased productivity. He told the committee he saw no reason to believe that the rate of technological progress will change substantially and that the job ahead is to "offset this tide of new unemployment and to channel those already unemployed into productive activity."

Wants Week Shortened

To find a practical program for reemployment, Mr. Green added, the AFL is giving careful study to a proposal to be announced at some subsequent date. He left these immediate suggestions with the committee: (1) Compile more complete facts and figures on employment, wages, hours, labor, costs, and productivity to better understand changing conditions; (2) Shorten further the work week; (3) Increase the national income (the AFL claims to be developing a proposal for accomplishing this); (4) Give exhaustive consideration to employment opportunities on a national basis with representative groups participating.

Mr. Green also called the committee's attention to "readjustments" which he said are directly or indirectly attributable to war developments. Specifically he mentioned the shipbuilding, aircraft construction and machine tools industries as being directly affected by war activity, insisting that the problem of employment

opportunities already caused by industrial changes will be further aggravated by "these special conditions." Industry and the public ought to take full cognizance of these developments, the AFL chieftain said.

Complaints that improved use of coal, advances in heat engineering, and competition from gas, oil and hydroelectric power were displacing coal miners and cutting down the consumption of coal were brought before the committee by Thomas Kennedy, secretary-treasurer of the CIO's United Mine Workers of America. Protesting that these competing fuels come from "practically laborless industries," the CIO spokesman urged that the Government consider a program to assist the bituminous and anthracite industries to advance their markets and create employment; enact legislation equalizing taxes on competing fuels; and consider the possibility of taxing and regulating labor-saving machinery.

75,515 Found Displaced

He estimated that while technological advances have eliminated 131,000 jobs in bituminous mines from 1923 to 1938, actually the displacement of workers was held to 75,515 by reducing hours and days worked during the year, and by sharing of work.

Depicting industry's side of the picture, Charles O'Neill, president of the United Eastern Coal Sales Corp., New York City, explained to the committee that unemployment would be greater today, rather than less, if there were no mechanization within the coal industry. He emphasized that the installation of mechanical devices has made it possible for mines to continue in operation in the face of competition from rival sources of power.

Statistical tabulations submitted by Mr. O'Neill indicated that output per man per seven-hour day increased from 3.88 tons in 1923 to 4.68 tons in 1937, or 20.6 per cent; that the percentage of total production cut by machine increased from 11.9 in 1896 to 79.3 in 1936; and that the percentage of underground production mechanically loaded by all types of equipment increased from 0.3 in 1934 to 20.2 in 1937.

After discussing the competitive situation of industrial fuels in terms of labor displacement, the witness advanced three remedies for the committee's consideration: (1) A substantial protective duty on imports of crude petroleum gas and fuel oils; (2) regulation by law of the dumping of industrial gas at rates that have no relation to costs; (3) withdrawal of the Federal Government from competition with private industry in the production of electric power.

Public Works Program Urged

Recommendations for a long-term works program to absorb employees affected by technological improvements were made to the committee by Corrington Gill, assistant WPA commissioner, whose agency once conducted a white collar project on technological progress and the unemployment problem. Isadore Lubin, head of the Labor Department's Bureau of Labor Statistics, was much less specific, offered no definite program, but insisted that "some way" must be found to solve the difficulty.

He conceded that inventions, labor-saving machinery, and technological progress must continue to be encouraged, and advised the TNEC that, while state and national governments recognize the responsibility of employers and the public for disabled employees, they make no provision for

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It is Mr. Lubin's division which would conduct the "continuing studies" of productivity and labor costs in industry under a proposed $100,000 program embodied in a bill passed last month by the House. In urging enactment of the measure, Labor Department officials have emphasized what they call "the importance of some public agency keeping constantly informed of the development of new techniques in leading industries" so as to determine the productivity per man-hour of labor, the ensuing changes in labor costs, and the extent of labor displacement.

New Deal Agencies Endangered By House-Approved Measure

WASHINGTON — The myriad of quasi-judicial and semi-legislative administrative agencies which have gone their unhampered way in recent years, riding roughshod over the rights of affected parties and in some cases reading into law things which Congress never intended, see in the House-approved Logan-Walter bill a dire threat to their existing power. Their argument is that the measure would slow administrative procedure to a standstill, clutter the courts with an endless number of cases, and make ineffective laws which Congress specifically empowered them to administer.

On the other hand, sponsors of the bill, insisting that its provisions would merely subject administrative agencies to a uniform procedure and properly curb certain functions, point to numerous cases of procedure which have been bitterly and justifiably criticized. Always standing out in front when examples of high-handed tactics on the part of Washington administrators are cited is the record of the National Labor Relations Board. But standing with the NLRB are other agencies like the Securities and Exchange Commission whose rules and regulations in some instances have been criticized as both harsh and unwarranted.

Steel Wage Case Criticized

The Labor Department's Public Contracts Division, administrative agency of the Walsh-Healey Public Contracts Act, has not been immune from criticism in the matter of misuse of administrative powers. Its handling of the steel wage case, in which it sought to fix a minimum wage for companies contracting with the Government, is an outstanding illustration that this agency should be included with others charged with going in for administrative excesses.

Because the Labor Department attempted to ignore a wage differential of 40 years standing in the steel industry, by grouping in the same wage area mills in the East with those in the Pittsburgh, Youngstown and Chicago, mills in the Eastern area enjoined the Secretary of Labor from enforcing her steel wage determination.

The steel companies did this by bringing suit in the Federal District Court for the District of Columbia, charging that the Government had exceeded its statutory authority by misinterpreting the term "locality"—heart of the Walsh-Healey Act. That court dismissed the case and the steel companies appealed to the United States Court of Appeals for the District of Columbia. Several months later the appellate court sustained the contention of the steel concerns, holding that the Secretary of Labor had gone beyond the authority conferred by the statute. It ordered a continuance of a temporary restraining order which permitted all members of the steel industry to bid on Government contracts without regard to the steel wage order. The Government then appealed to the Supreme Court on a writ of certiorari.

Typical Procedure

Had the Logan-Walter measure been on the statute books when the steel wage controversy arose, the procedure would have been something like this:

1. Litigants could complain against the Secretary's steel wage order by going before an intra-agency board. A recommended decision would then be sent to the Secretary.

2. If the recommendation was rejected, the steel companies could take the grievance direct to the Circuit Court where the measure of proof would be relaxed. (At present the action must be shown to have been capricious and arbitrary whereas under the Logan-Walter bill the order

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could be set aside if findings of fact were erroneous or not supported by substantial evidence.)

3. The Circuit Court could weigh the previous proceedings before the Labor Department. (The present practice is to ignore prior proceedings on a case.)

4. If two or more appellate courts disagreed on the controversy, assuming that some of the litigants brought an action in another federal court, the issue would go automatically to the Supreme Court.

The net result, according to sponsors of the measure, would be to expedite relief and reduce costly and time-consuming procedure. All aggrieved parties would be assured of a uniform pattern of procedure being followed by all agencies brought within the scope of the bill.

Steel Industry Watches ICC Action in Monessen Road Case

WASHINGTON — Because it deals with a subject which, it is reported, the Federal Trade Commission proposes to present to the Temporary National Econmic Committee, unusual interest has been taken in a proposed report made last week by Examiner Frank Weaver recommending that the Interstate Commerce Commission reverse a former decision by finding that freight allowances made by the Pittsburgh & West Virginia Railroad to the Monessen Southwestern Railroad, owned by the Pittsburgh Steel Co. is not unlawful. Originally the commission held to be unlawful the arrangement under which the P. & W. Va. employs the steel plant carrier to project the former's line-haul service on carload traffic from its terminus, Monessen Junction, Pa., to the Rostraver yard of the Monessen Southwestern at Monessen.

The commission finding was made in the ninth supplemental report based on an investigation regarding terminal services and allowances by independent railroads for switching or spotting services at industrial plants performed by industry-owned rail lines. In its decision the commission attempted to apply principles governing the switching and spotting situation at the plants of the Pittsburgh Steel Co., and its subsidiaries, the Pittsburgh Steel Products Co., and the National Steel Fabric Co., all located at Monessen. Findings in the Pittsburgh Steel Co. case have been closely followed because of the expected bearing it will have on a situation that prevails at other steel plants as well as at the Monessen plant.

Wants Legality Tested

Broadening the scope of the commission's decision, the examiner held that by employing the Monessen Railroad to perform actual service, the P. & W. Va. projected its line-haul service, the Monessen functioning as an agent and as a practical substitute for the physical extension of the P. & W. Va. For this reason it was held that the legality of the arrangement should be tested by the provisions of the Interstate Commerce Act governing the extension of rail line rather than principles governing switching.

The commission had said that the Monessen was a steel company plant facility. Service performed by such a railroad beyond given points of interchange, the commission held, was a plant service for which line-haul carriers received no compensation and were not required to perform under their rates. Payment by the line-haul railroad of an allowance to the steel company or its "plant facility" carrier, it was further held, gave a preferential service not accorded to shippers generally.

Both the Pittsburgh & Lake Erie and the P. & W. Va., prior to the commission's report, paid allowances to the Monessen for handling steel traffic, except ex-lake iron ore, between points of interchange and points of loading and unloading. The allowances were based on the actual cost of the service with a P. & L. E. maximum of 6.6c. per ton and a P. & W. Va. maximum of 10c.

Allowances Discontinued

When the commission handed down its order, the P. & L. E. discontinued paying allowances for switching beyond the Rostraver yard. The P. & W. Va. filed a tariff, effective July 15, 1935, and limited its allowance to shipments between Monessen Junction and Rostraver yard, the latter regarded by the railroad as its point of interchange.

The proceeding was reopened to determine the point at which the P. & W. Va. was obligated under its line-haul rates to receive and deliver carload freight at Monessen for the steel company. Under that arrangement, the examiner said, allowances had been paid on intrastate but not on interstate shipments.

The arrangement by which the P. & W. Va. is permitted to operate on the Monessen line for the receipt and delivery of steel, the examiner said, put the P. & W. Va. on a competitive basis with the P. & L. E., which, it was added, carries most of the steel company's tonnage.

The examiner said that the Monessen, due to its non-common carrier status, is not subject to the Interstate Commerce Act, and is under no legal duty to comply with any of its provisions.

"There is considerable doubt as to whether the P. & W. Va., before it employed an agent to project its line-haul service to Rostraver yard, was legally obligated to obtain a certificate of public convenience and necessity," said the examiner's report. "Any legal obligation that the P. & W. Va. may have been under in the beginning is not now controlling. The arrangement continuously has been in effect over a long period of years and its legality should be determined in the light of that fact."

Allies Order $200,000,000 Of Latest U. S. War Planes

WASHINGTON — Army and Navy releases have resulted in British and French orders for $200,000,000 of the latest type of planes and engines. It has been estimated that 2000 or more planes are covered in the orders. Announcement of the orders was made by the Allied Purchasing Board, whose secretary - general, Charles T. Ballantyne, said the price included the development cost item urged by the War Department to provide for retooling of plants to produce advanced types and the cost of required additions to aircraft engine plants to fill allied orders. The plant additions are for the Pratt & Whitney Division of the United States Corp., the Wright Aeronautical Corp. and the Allison Division of the General Motors Corp.

Chairman Arthur Purvis of the board said the contracts had been signed with Wright and Allison for engines and with the Curtiss airplane division of the Curtiss-Wright Corp., the Bell Aircraft Corp. and the Douglas Aircraft Corp. for planes and that a contract for Pratt & Whitney engines was ready for signature.

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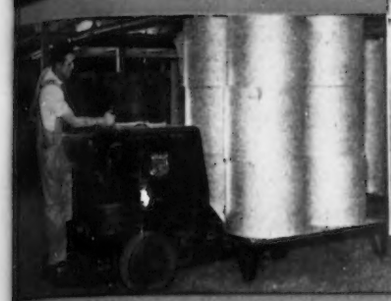

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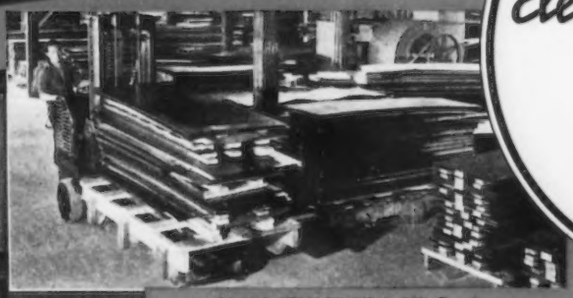

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Broad Wagner Act Revisions Seen Unlikely This Session

WASHINGTON — Predictions now are being freely made that the present session of Congress will do little, if anything, in the way of amending the Wagner labor act. So far as wishes of industry for broad changes are concerned the prospect is held to be totally out of the picture. Even should the House pass important amendments, it is believed they would be blocked in the Senate, which also is expected to pigeon-hole Wage-Hour Act amendments, regardless of House action.

There is a view that the Logan-Walter administrative bill can by a little pressure be brought to the floor of the Senate and passed in that branch, following the overwhelming House vote for it, but that in such a case it would be vetoed by the President. The latter view contrasts with that held heretofore in some quarters that if the measure got a heavy majority vote in the Senate the White House would yield to Congressional sentiment and sign it.

AFL Pushes Norton Bill

If any amendments are voted in the House to the Wagner act, it is held to be improbable that they will go beyond the Norton amendments, with nothing more than a possibility that it may accept minor amendments proposed by the majority of the Smith Special House Committee which is investigating the National Labor Relations Board. The American Federation of Labor is intensifying its drive for the Norton bill by a personal campaign among House and Senate members, while at the same time the Congress for Industrial Organizations is with equal vigor fighting the bill, particularly the craft union amendment. But the House majority is pro-AFL and though weakening in its attitude on amending the Wagner act may pass the Norton bill. At the same time, it realizes that the Senate is not likely to go far, if it does anything, toward amending the act and therefore is reluctant to bear the brunt of labor attack during the political campaign should it vote for any broad changes in the law.

In view of accumulating evidence before the Smith Committee of the maladministration of the Wagner act by two of the three members of the Labor Board—Chairman Madden and Edwin S. Smith—it is believed that the House will vote for the Norton amendment to increase the board membership by two. The Senate, it is believed, might content itself with such an amendment and go no further. Despite a contrary view in some quarters it is believed that the President would appoint two additional members who, with member William L. Leiserson, would give the board a more conservative turn than it now has.

Votes to Restore Funds

But the much-needed cleaning up of the board and its staff is not expected at this time. Testimony being presented before the Smith Committee only emphasizes the need, but to a large extent is repetitive or amplification of earlier evidence. Rather than being influenced by the evidence the majority of the Senate has voted to restore board funds which had been slashed by the House. The Senate granted $228,000 of the $337,000 cut made in the House. Should the Senate vote be upheld in conference the board will get $3,071,000 for the 1941 fiscal year, or only $109,000 under the President's estimate of $3,180,000.

The Senate bill specifically provides $45,600 for the board's division of economic research, voting for it as the division's head, David J. Saposs, was being lashed before the Smith Committee as a radical, along with a general attack in which the board was charged with being "replete with rotten radicalism." The House had voted down funds for the division. It wanted the division abolished entirely.

In the course of a bitter denunciation of the board, Mapes Davidson, former board trial examiner, told the House Committee that Saposs was "trying to sabotage every American principle of justice and fair play." Davidson resigned from the board two days after board trial examiners in Washington had been called to a meeting at which, he said, Saposs gave them a lecture on "what should be gotten into the record at a Labor Board hearing, aside from direct evidence, to show by inference that employers are fostering company-dominated unions."

Don't "Bother" with Welfare

After hearing the speech by Saposs, whom he called a "known Communist," Davidson said he directed a letter of resignation to the board. Davidson told the committee that Saposs said that in cases where there was no di-

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rect evidence of company domination it was necessary for trial examiners "to build up complete background — even over a period of years, showing any past acts of domination." Saposs also was quoted as having suggested that it should be shown whether the employer was engaged in welfare work among employees since they "are generally anti-union and those who deal with the big union do not bother with that sort of thing."

When an examiner asked how examiners, the board or the courts had any right to base an order against an employer on anything but evidence, Davidson said Saposs replied that this could be done "if there is sufficient history of company domination."

Davidson definitely excluded Mr. Leiserson, General Counsel Charles Fahy and Assistant General Counsel Robert Watts from the charge of fostering communism. At the same time he referred to Acting Chief Trial Examiner Frank Bloom as "an incompetent radical if ever there was one." Bloom, Davidson said in his letter, obtained his position "by the grace of his fellow Red, Nathan Witt, secretary of your board."

Witt telegraphed Davidson that the board had discharged him with prejudice and without accrued annual leave "for addressing a false and scurrilous letter to the board.

Addressing a letter to Chairman Madden and Board Member Smith, Davidson replied that he was at a loss to understand "how even your board, with its scarlet record of unjust and tyrannical practices, can dismiss an employee who has already resigned." Further in his letter, Davidson said:

"So you ran true to form by holding just one more drumhead court-martial at which only one side received consideration. You are truly a disgrace to the democratic processes of the nation."

In closing, the letter said: "Continue your Roman holiday while you can. Something tells me that, like the turkey two days before Thanksgiving, you won't be around long."

Assuming a characteristic pose of indifference to criticism, Chairman Madden replied to the latter.

"His outgivings are such obvious nonsense that one is surprised that they should have been noticed," Madden wrote.

Reflecting further the utter intolerance of the employer's position as well as the complete absence of dignity shown by the board staff in preparation of cases were notes of Board Attorney Herbert Fuchs submitted by Committee Counsel Toland. Mr. Toland

brought out that in his personal notes, Fuchs had written "nuts" in answer to exceptions filed by the Newport News Shipbuilding & Drydock Co. This street slang, Fuchs naively explained, was a "form of shorthand."

South Africa to Lift Steel Ingot Capacity

WASHINGTON—South Africa's iron and steel industry, which has experienced a remarkable growth in the past six years, is to be expanded further, says a report from Consul Russell M. Brooks, Johannesburg. An announcement just made by the chairman of the Iron & Steel Industrial Corp., Ltd., states that it plans to increase the production of the company's plant at Pretoria to 450,000 net tons of steel ingots per year and to erect a new steel works at Vereeniging, Transvaal. The new plant will be used chiefly for the manufacture of lighter steel products, heavier items continuing to be produced in Pretoria.

Reviewing the history of the corporation, the announcement pointed out that the first ingot was cast at Pretoria in 1934, and during that year 66,000 tons of steel and 144,000 tons of pig-iron were manufactured. In 1938 production had risen to a total of 332,000 tons of steel and 300,000 tons of pig iron.

Interest Rate on U. S. Steel Bonds Not Yet Announced

WASHINGTON—Covering $75,000,000 of serial debentures, the United States Steel Corp. last Thursday filed a registration statement with the Securities and Exchange Commission. The net proceeds from the sale of the debentures, together with approximately $24,559,617 of cash funds, are to be used to redeem on or before July 15, 1940, at 103 per cent plus accrued interest to that date, $95,140,000 of the corporation's 10-year 3¼ per cent debentures due July 1, 1948. It was stated that the aggregate amount required for such purpose will be $98,372,117. The remainder of these debentures outstanding in the principal amount of $2,441,500, the statement said, will be called for redemption on or before June 1, 1940. Funds for such redemption have been deposited in the sinking fund. The new issue of debentures will mature $2,500 000 semi-annually, Nov. 1, 1940, to May 1, 1955. They will be offered to the public at 100 per cent and the underwriting spread will be 1¼ per cent. The interest rates will be furnished by amendment.

Machine Tools Seen as Vital

"ON the basis of experience with the aircraft industry since last September and the studies of the entire national defense problem made by the Committee on Cooperation with Government Departments (of the National Machine Tool Builders Association), in case of actual defense need, I can state confidently that our industry will be able to produce machine tools for all purposes required just as fast as men can be found and trained to operate them," wrote Charles J. Stilwell, president of the Warner & Swasey Co., in a paper presented at a meeting on national defense held at the Hotel Astor, New York, April 25, on the occasion of the annual spring round-up of the Metropolitan section of the American Society of Mechanical Engineers. The paper was read by Warner Seely, secretary of the company, in Mr. Stilwell's absence.

War has become mechanized, and with the tremendous increase in the use of armored cars, tanks and guns of many sizes and purposes, besides aircraft, national defense requires the marshalling of the metal working industries and the cooperation of all heavy industries in this country to an extent never before dreamed of and to a degree not yet fully realized. It is finally being realized, however, that fundamental to all the production of the metal working industries is the machine tool industry, continued Mr. Stilwell.

This industry has already had a foretaste of an industrial preparedness program, due to the unprecedented demands made upon it for machinery to manufacture aircraft, especially aircraft engines. This demand arose chiefly because of the enormous orders for airplanes placed with American aircraft manufacturers by the British and the French. Added to that was a further demand for airplanes for our own defense needs.

Aircraft Demands Immense

The machine tool industry found itself suddenly confronted with the immediate necessity of producing an enormous quantity of tools designed for aircraft purposes. These are mostly special machines, and even those which are standard must be equipped for the most part with special tooling. They must work to very close limits of tolerance.

The machine tool industry added enormously to its equipment. It extended its working hours from one shift to three shifts. It farmed out parts-making wherever practicable. It extended plant capacity. Between the time war broke out in Europe and the present date, production in the machine tool industry has more than doubled.

The experience of our industry in this situation, Mr. Stilwell wrote, is an index of what can and will be accom-

Factor In National Defense

plished in case our defense requirements should become more urgent and the machine tool industry should be called upon to furnish machines not only for aircraft but for many other national defense purposes. Machine tools will be needed for ships, for guns, large and small, for tractors, for every type of military equipment. Our industry will be able to produce machine tools for all purposes required, however, only in case proper planning as to machine tool requirements can be carried out in advance.

All Takes Time

Machine tools for various national defense requirements will have their own particular specifications, requiring preliminary designing and engineering work. Machine tools are precision instruments. Accuracy of product is possible only in so far as accuracy is built into the machine tool which makes it. This requires extremely careful workmanship and a reasonable amount of time.

So, while the machine tool industry is confident of its ability to meet any demands which the defense requirements of this country may place upon it, the industry urges most emphatically that planning, with respect to such requirements, be done well in advance so that when and if the time comes when plans must be put into execution, the groundwork will have been laid, and production can go forward immediately. But the need for careful advance planning is by no means confined to the machine tool industry. Planning should right now be extended to every branch of manufacture in the United States which may have any possible bearing upon national defense.

Three Defense Steps

Fortunately the United States Government is already using three different methods to determine where, and how rapidly, it may secure from American industry the supplies and equipment needed for national defense. First is the current buying of munitions for the use of the army; second, educational orders, third, the purchase of production plans.

The first method is a very effective way of developing a potential industrial supply of munitions, but on the basis of current appropriations the Government cannot afford to purchase enough supplies to educate very many companies.

The second solution is the educational order, the use of which started in 1939. The contract for a given item requires the setting up of a production line, but only enough items are produced to test the facilities of that production line. The machine tools and equipment that must be purchased for that purpose are paid for by the Government and are then held in the contractor's plant or placed in storage to be readily available in time of national

emergency. Existing equipment devoted to this purpose either must be kept on hand for a period of five years after the date of the contract or must be replaced by new equipment that will do the same work if an emergency should arise. Under this program, a very large number of sources can be given experience. There are listed in the Procurement Planning Division something like 9000 potential industrial sources for items of munitions, and of these the division hopes to give 1200 key plants a more intensive experience.

The third method used by the Government is that of paying a company for the expense of developing a plan involving the production of munitions in this company's plant. Under this method, at least the preliminary planning has been accomplished, but this latter method does not possess the advantages of the educational order because it does not involve setting up equipment, and therefore, the equipment might not actually be on hand when needed.

It is obvious that the Government is counting heavily the cooperation of industry. But meanwhile there is an important difference of opinion between Government and industry with respect to taxes—a difference of opinion which is seriously interfering with the capacity of industry to place itself in position to meet the defense requirements of the United States. The Government insists that additions to plant equipment and plant expansions made on behalf of national defense be written off only in conformity to the same rules which apply to normal peacetime additions to equipment or plant.

New Tax Policy Needed

It is the contention of the machine tool industry that industry should be allowed to write off, as operating costs, expenditures or expansions made for special purposes of defense within the period of time to which those requirements may be expected to apply.

To date the Government has said "no" to any such idea. If a company tries to pay for the required new equipment and plant expansion out of income, the Government may rule that the company is attempting to keep an improper share of its earnings in the business and may impose a penalty surtax. As long as this policy of the Treasury Department continues in force, cooperation upon the part of American industry is destined to be burdened with undue risk.

American industry is not asking for war profits nor for profit insurance, said Mr. Stilwell. It is not asking the Government to assume normal business risks. But when a business enterprise assumes an unusual risk as a part of a program to safeguard the nation as a whole, it does not seem reasonable to expect that enterprise to incur tax penalties imposed upon it by reason of the very risk it has been asked to assume.

Cooperation Needed

"I have placed considerable emphasis upon this particular tax problem because I feel that if national defense becomes a vital issue, this particular situation may suddenly confront all American industry," continued Mr. Stilwell. Industry will be expected to perform, but that same industry must look forward at the close of the emergency to another long and painful period of readjustment. Why should not industry expect its Government to deal fairly and justly with it with respect to these problems of emergency expansion, resulting taxation, etc.?

Such foresighted provision on the part of the Government would seem a far wiser method of protecting industry, enabling it to continue the employment of men, and of insuring industry's continuance as a normal tax-paying unit —certainly a far wiser policy than one of looking forward in years to come to further series of economic experiments.

Power Also a Factor

Government policy was also criticized in a paper dealing with the part that power plays in a program of national defense, prepared by R. C. Roe, president of Burns & Roe, Inc. While utilities in general have been most progressive in the installation of new and more efficient equipment, they can, however, only make such investments in plant provided they can attract the capital for such improvements. Discriminatory legislation, direct Government competition or regulation so burdensome as to be almost confiscatory does not attract such capital. As a result of such policies, Mr. Roe indicated that there had been a decrease in reserve capacity of utility systems throughout the country compared with what would be normal if restraints on the industry were removed. He concluded that while power facilities are adequate in general, we should make every sound peacetime effort to improve this situation and be prepared in the event of war to supplement the power supply in those places where deficiencies exist.

Ordnance Procurement

Capt. Daniel J. Martin, chief of the armament and cannon sections, Office of the Chief of Ordnance at Washington, outlined the organization and function of the Ordnance Department and the magnitude of the munitions program in national defense. He indicated that in time of war our arsenals will be able to handle less than 10 per cent of any real munitions program. The other 90 per cent must be handled by American industry. In order to decentralize this work, the Ordnance Department has organized 14 procurement districts. Through these districts the department is now attempting to prepare industry (1) by means of educational orders (2) by going out into the market and buying from industrial concerns production studies (3) by accumulating a supply of war stocks of strategic materials that would be difficult to obtain in time of war (4) by actually placing current production orders with industry. During the present year about $100,000,000 worth of contracts have been placed with industry. Difficulties in manufacture are being overcome, and orders with these concerns are right up to schedule.

At the same session, Harold V. Coes, manager of the industrial department, Ford, Bacon & Davis, Inc., explained the scope of the so-called educational orders for ordnance production. The general plan is to give a manufacturer experience in making items of a non-commercial nature. The job is tooled up for mass production methods, but the quantity of material actually contracted for is small. Sometimes only a sample of each necessary tool is made. The Ordnance Department of the U. S. Army, according to Mr. Coes, expects to place 60 critical military articles with 275 private plants on an educational order basis within the next two years of the program. Running concurrently with the educational order program for the fiscal years 1940 and 1941 will be comparatively large current production programs for the initial armament requirements. Un-

fortunately, Congress at the present moment is atempting to chisel the 1941 program for educational orders from $16,250,000 down to $2,000,000, feeling that American industry is due to get all this necessary experience in the production of munitions for the Allies before very long.

Air Transportation

The importance of air transportation in national defense was brought out by Col. Frank P. Lahm, air officer of the Second Corps Area, who indicated that already the Air Corps of the U. S. Army was self-contained as far as transportation of personnel and matériel was concerned. About the only supplies that need be shipped by rail or truck are spare wings. The Air Corps, he said, is in the midst of an expansion program and by July 1, 1941, will have 5500 planes.

This special meeting of the A.S.-M.E. was presided over by Howard Coonley, president of the Walworth Co. and past-president of the National Association of Manufacturers.

AFL Unions Now Confer With Arnold

WASHINGTON—Now that the Department of Justice has obtained several anti-trust indictments against AFL building trade unions, union officials are conferring with Assistant Attorney General Thurman Arnold on the anti-trust division's attitude toward future conduct of the unions.

The negotiations under way are in sharp contrast with the belligerent statements previously made by AFL President William Green when Mr. Arnold first made known his plan to prosecute unions under the anti-trust laws in instances where their activities have no reasonable connection with such legitimate objectives as wages, hours, safety and health. Mr. Green called the Arnold interpretation that unions are subject to the anti-trust laws "a grave perversion of the law," insisting that it was "inconceivable" that "an Administration notable for its friendliness to labor should adopt a retrogressive policy."

Get Similar Treatment

Union conferees have learned that conditions under which future activities of the unions will be measured are similar to those laid down by the anti-trust division for business groups.

This means, for instance, that those who are not parties to a pending anti-trust action can avoid criminal prosecution by making a complete disclosure to the department of existing or contemplated activities which they consider to be in reasonable restraint of trade. The party will thereafter proceed at its own peril if the department finds after examination that the projected activity is in violation of the anti-trust laws.

Should the department announce its inability to assert positively that the plan is legal or illegal, the party can proceed with its plan and any future action by the anti-trust division will be through civil proceedings.

On the other hand, those who are already parties to pending anti-trust action against a union, may offer before or after indictment a civil decree which will be accepted for submission to the court if the Department finds that the terms are an adequate remedy for conditions attacked in the criminal proceeding. Under this policy, a settlement by civil decree would terminate a jurisdiction dispute, for example, and would compel the unions to accept mandatory arbitration of future disputes. Penalty for non-compliance would be a contempt charge.

Two Large Hardware Firms In St. Louis Are Merged

STOCKHOLDERS of Simmons Hardware & Paint Corp., St. Louis, will be asked at a meeting June 21 to approve sale of the company to the Shapleigh Hardware Co., St. Louis, in a merger of two of the largest and oldest hardware firms in the country.

The Shapleigh company, according to a statement by L. E. Crandall, Simmons president, has offered to pay $2,700,000 for the Simmons company and its wholly owned subsidiaries, Simmons Hardware Co., Mound City Paint & Color Co. and Simmons Warehouse Co.

The history of the wholesale hardware business in St. Louis is, to a great extent, the history of the Simmons and Shapleigh companies, officials of the latter company noted in announcing the purchase. Both companies had grown rapidly and had issued large general catalogs for their customers by 1880. The Shapleigh company will continue the Keen Kutter and other lines of the Simmons company.

Detroit Metallurgists Hear Talk on Diffusion Research

DETROIT—A round-table discussion of the most recent stages of research on diffusion in metals was conducted at the April meeting of the Detroit section of American Institute of Mining and Metallurgical Engineers by Dr. E. O. Kirkendall, of Wayne University. Following an introductory treatment of diffusion by Dr. Kirkendall, metallurgists from surrounding industrial plants engaged in the discussion which centered largely around problems of carburizing and hardening, and recent uses of surface coating.

Electro Manganese Corp. Offers Research Prize

ELECTRO MANGANESE CORP., Minneapolis, is offering $150 in awards for each of three prize winning papers representing original fundamental research work on electro-manganese (99 + Mn) and its alloys or compounds. Such work may be in the fields of metallurgy, metallography or chemistry, and the winning author must be registered as an undergraduate or graduate student during the time of the experimental work. All papers must be submitted to the Electro Manganese Corp., research department, 527 Rand Tower, Minneapolis, in duplicate before midnight, Friday, Sept. 20, 1940. Three prominent engineers, not employees of the company, will act as judges.

Gibson Electric Buys New Plant at Pittsburgh

GIBSON ELECTRIC CO., manufacturer of Gibsiloy electrical contacts for use on circuit opening and closing devices, has just purchased a three-story plant at 8344 Frankstown Ave., Pittsburgh. The new plant, a modern brick and concrete building containing 15,000 sq. ft. of floor space, will be occupied by the company on May 1.

Carpenter Steel Stocked By Dayton Warehouse

INDUSTRIAL STEEL SERVICE, warehouse division of Dayton Fabricated Steel Co., Dayton, Ohio, announces that it has stocked in that city for the first time a complete line of Carpenter Steel Co. tool steels.

Bethlehem Reports Best First Quarter in Company's History

BETHLEHEM STEEL CORP.'S net profit of $10,891,139 in the first quarter of 1940 was the highest for any first quarter in the company's history, Eugene G. Grace, president, announced this week. He reported the company's current operations at 74 per cent (compared with an average of about 60 per cent for the entire industry) and said that incoming business would support a 75 per cent operating rate. The company earned $2,409,059 in the first quarter of 1939 and $13,028,928 in the fourth quarter of last year.

The estimated value of orders on hand, March 31, said Mr. Grace, was $255,802,117 compared with $287,002,024 on Dec. 31, 1939, and $192,040,906 on March 31, 1939, while steel production in the first quarter of 1940 averaged 87.4 per cent against 98.6 per cent in the fourth quarter and 53.8 per cent in the first quarter of last year. A common dividend of $1.25 will be paid June 1 to stock of record May 10. First quarter net income was $3.02 a share compared with $0.17 a share in the like period of 1939.

Outlook Encouraging

Prospects for improvement in business during 1940 are good, Mr. Grace said. Export business, which was about 12 per cent of the company's 1939 bookings, is now playing a bigger part, and its shipbuilding department continues very active. The steel industry's 60 per cent operating rate is not unfavorable, when extensive inventory building of steel consumers late in 1939 is considered, he added.

The Bethlehem president said he believes that domestic demand is at the low point, and said that the principal demand from abroad is for commercial steel.

The Bethlehem company's billing prices have been on an upward trend, Mr. Grace said. The steel executive said his organization, which could see no reason for recent weakness of steel sheets, had canceled the recent $4 a ton cut in sheet prices as of May 1, accepting orders at the lower price until that time for delivery before June 30. Announcement of steel prices at this time for the third quarter is a constructive move, Mr. Grace said, and one that should benefit both buyers and sellers of steel.

Bethlehem in the first quarter employed 111,339 persons, the highest peacetime total in its history, paying them an average of 92.8c. an hour, and providing a 36-hr. work week, compared with 92.4c. and 37.2 hr. in the fourth quarter. First quarter payroll for the company was $47,494,000 against $49,167,000 in the fourth quarter.

$450,000 Order Booked By Westinghouse

PITTSBURGH — Westinghouse Electric & Mfg. Co. recently received an order totaling approximately $450 000 for couplings and gear units for seven cargo vessels now being built by the U. S. Maritime Commission.

Earnings Average 4.2% in '39, Steel Institute Reports

STEEL companies earned a total of $140,394,000 during 1939 after meeting all charges but before paying dividends, according to reports received by the American Iron and Steel Institute from a group of companies accounting for more than 90 per cent of the industry's total output.

The same group of companies "went into the red" in 1938 to the extent of over $14,506,000 before paying any dividends, and the record of the steel industry as a whole over the 1930-1939 decade shows that the industry lost money in five of the ten years.

Combined earnings of the industry in the five years in which the industry did not lose money offset by a narrow margin the aggregate losses in the five unprofitable years (1931 - 1934 and 1938). As a result the industry's return on investment over the 10-year period averaged only 1.8 per cent.

As against an average investment of $4,180,600,000 in 1939, the steel companies last year earned 4.2 per cent on investment. That return compared with earnings of 0.5 per cent in investment the year before when steel operations were at a substantially lower level.

Total payrolls of the reporting companies last year, including payrolls of certain subsidiary companies which do not produce iron or steel products, amounted to nearly $971,000,000, compared with $730,000,000 the year before.

In each of the last two years, steel stockholders received less than 7c. in dividends for every dollar going into the company's payrolls. Dividends paid to the 520,000 stockholders of the companies in 1939 totaled $66,550,000, as against $48,935,000 in 1938.

Armco's First Quarter Earnings Total $1,005,193

CHARLES R. HOOK, president, American Rolling Mill Co., announces the company's consolidated earnings for the first quarter of 1940 were $1,005,193. This is equal to 17.4c. per common share after providing for dividends on the 4½ per cent cumulative preferred stock. Armco's consolidated earnings for the first quarter of 1939 were $793,479, equal to 10c. per common share. The 1939 earnings included non-recurring earnings of approximately $400,000. No. non-recurring income is included in the earnings for the first quarter of 1940.

Allegheny Ludlum First Quarter Sales Rise 51%

PITTSBURGH—First quarter sales of Allegheny Ludlum Steel Corp. were 51 per cent greater than those in the same quarter last year, according to H. G. Batcheller, president. Tool steel shipments were 84 per cent higher, stainless steel 82 per cent greater, and silicon steel 93 per cent higher than in the first quarter of last year, Mr. Batcheller said.

"The down turn in orders from the fourth quarter of 1939 is being reversed and for the first time in 1940 we are entering business at a volume slightly greater than shipments are being made," he said.

Allegheny Ludlum has felt very little effect from the war, according to W. F. Detwiler, board chairman, and although some tonnage has been received, the amount is negligible when compared with total business. Present directors were reelected at the stockholders meeting.

New Wrinkle, Inc., to Hold Technical Conference

FOR the purpose of acquainting its licensees' production superintendents with some of the company's latest developments, New Wrinkle, Inc., is planning a two-day technical production conference at Dayton, Ohio, May 17 and 18. The first day's program at the laboratory is to include demonstrations of the formulation, manufacture and application of wrinkle finishes of both the alkyd and varnish types. The next day will be devoted to an exposition of experimental developments in finishes. Some of the more important subjects to be covered include tung oil substitutes, infra-red drying lamps and reflectors, a new resin called Wrintex and air drying wrinkles for use on flexible materials. An open meeting is planned for Friday night at the Dayton Engineers' Club.

Southern Ohio Industry Escapes Flood Damage

CINCINNATI—While industry in the Southern Ohio area watched flood reports during the past week, the flash flood in the Cincinnati area of the Ohio River touched a 60-ft. crest and then receded, causing virtually no damage to industry. Andrews Steel Co. and the Newport Rolling Mill Co. plants suspended operations for a few days as a precaution should the water rise. Rail shipments were not curtailed, although there were some revision in river barge movements. A few scrap dealers were hampered in operations because of dampness in yards, but this did not affect the market as a whole.

Wheeling Steel Warehouse In New Orleans is Opened

FABRICATION and shipping of sheet metal roofing has begun in the new 60,000 sq. ft. warehouse and plant in New Orleans of the Wheeling Corrugating Co., a subsidiary of the Wheeling Steel Co., Wheeling, W. Va. The new plant, managed by E. E. Hummel, which at present is engaged in the manufacture of corrugated metal roofing, handles a complete line of steel products including galvanized and black sheets, galvanized roofings, wire nails, barbed wire, farm fencing, reinforced fabric roofing, terne plates, metal shingles, eaves troughs and fittings, and the Red Label Line of metal ware.

Pittsburgh Coal to Expand River Yards

PITTSBURGH — Pittsburgh Coal Co. is to expand its coal yards along Carson St. here below the Point Bridge and a large central distributing station to be established. Coal will be shipped in by rail and distributed throughout the district by truck, it was said.

Hisey-Wolf Company Sold

THE Hisey-Wolf Machine Co., Cincinnati, one of the oldest manufacturers of electrically-driven portable tools, has been sold to Louis Goldsmith, who bought the company from John W. Friedlander and Carl I. Friedlander, Cincinnati, co-executors of the estate of Walter J. Friedlander. The Hisey-Wolf Company was organized about 45 years ago by the late Joseph Wolf, Cincinnati, and the late Charles F. Hisey, Aurora, Ind. The company plans to increase its sales force.

James D. Maitland New President of Concrete Reinforcing Steel Institute

JAMES D. MAITLAND of the Colorado Builders' Supply Co., Denver, Colo., was elected president of the Concrete Reinforcing Steel Institue at the annual meeting, April 26 and 27, at Hot Springs, Va., succeeding J. R. Fenstermaker of the Hugh J. Baker Co., Indianapolis, Ind. Blair M. Boisseau of the Virginia Steel Co., Richmond, Va., was elected first vice-president, and Ralph Healy of Igoe Brothers, Newark, N. J., was elected second vice-president.

Problems of the industry, which have been complicated recently by extreme price weakness, were discussed at some of the meetings.

The only scheduled address was by Thomas S. Holden, vice-president in charge of statistics and research of the F. W. Dodge Corp., New York, who said that failure of building activity to attain the volume that had been expected this year was due to the uncertain trend of general business, the prolonged severity of the winter and tardiness in meeting announced schedules in the public housing and highway programs.

Private Work Needed

"Public work has been tapering off," said Mr. Holden, "and the question of continued recovery gains depends upon whether private construction can continue to increase in sufficient volume to offset declines in public construction activity.

"The 1939 record encouraged up at the opening of the year to believe that private construction should continue to increase at a satisfactory rate. Last year's gain in contract volume over 1938 for 37 Eastern states amounted to $353,000,000, or about 11 per cent. The dollar increase for private construction was $350,000,000, compared with a gain of only $3,000,000 in publicly-financed construction. Private non-residential building increased over 1938 by $49,000,000; private residential building increased by $144,000,000, and privately financed engineering construction increased by $57,000,000. The net gain of $3,000,000 in publicly financed construction resulted from (1) a decrease of $156,000,000 in publicly financed non-residential building; (2) an increase of $104,000,000 in publicly financed residential building, mostly subsidized public housing; (3) an increase of $55,000,000 in publicly financed engineering work."

Comparing this year's figures with last year's, Mr. Holden said that as of April 15 the dollar volume of private construction contracts was nearly 8 per cent ahead of the figure for the corresponding period of 1939, while public building and engineering contracts were 32 per cent behind last year. The total contract figures for the period from Jan. 1 to April 15, this year, were $821,845,000 compared with $937,097,000 for the corresponding period of 1939, a decrease of approximately $115,000,000. Private work increased by $36,000,000, while public work decreased by $151,000,000. By construction classifications the changes from last year in the first

three and a half months were as follows:

Commercial building contracts increased $13,000,000.

Factory building contracts increased $25,000,000.

Public and institutional building contracts decreased $93,000,000.

All non-residential buildings suffered a net decrease of $55,000,000.

Residential buildings (including private and public projects) increased $2,000,000.

Heavy engineering projects (public works and utilities) decreased $62,000,000.

"In view of the year's slow start and the recent signs of improvement, the estimate of an 11 per cent increase in private construction for 1940 as a whole, as published by the F. W. Dodge Corp. at the opening of the year, seems very likely to be attained or even bettered," said Mr. Holden. "An early upturn in the industrial production index, even though moderate, coupled with some increase in war orders, should make for continued increases in commercial and industrial building. The increased volume since March 1 on mortgages selected for appraisal and mortgages accepted for insurance by the Federal Housing Administration indicate continued rising volume of small house construction.

"More doubtful, as affecting the total construction volume tor the year, is the future course of public building and engineering work. The Dodge 1940 estimates indicated a 10 per cent decrease from last year in dollar volume of public construction, and this year was 32 per cent behind 1939 on April 15. In view of this situation, there is a real question as to whether the public construction record will be bettered in the coming months. Failure of public construction contracts to reach the estimated goal might be favorably offset by increased private construction greater than the previously estimated 11 per cent."

Carnegie-Illinois Replaces Old Soaking Pits at Gary

GARY, Ind.—Carnegie-Illinois Steel Corp. here is replacing a number of obsolete soaking pits, construction on which is to begin soon. Eight new pits will be built by the Amsler-Morton Co. of Pittsburgh and the construction and operation will be similar to those installed by the same company at the Edgar Thomson plant, Braddock, Pa., more than a year ago.

The only exception in the design at the present time is that the new pits here will be direct fired but provision is being made so that recuperators might be installed at a later date. The new facilities are the most modern type and are expected to result in a better fuel economy in addition to improved quality of heating.

Sheet & Tube to Rebuild Valley Blast Furnace

YOUNGSTOWN—Youngstown Sheet & Tube Co. has awarded to the William B. Pollok Co., Youngstown, the contract for rebuilding blast furnace "C" here. Capacity of the stack will be enlarged from 650 tons per day to around 950 tons per day. Work is to be started soon.

Non-Ferrous Casting Defects

COPIES of the tabulation of "Non-Ferrous Casting Defects," published on pages 46 and 47 in this issue, on heavy varnished paper, 22 x 22 in., suitable for wall mounting, can be obtained at a cost of $1 per copy from Lucius Pitkin, Inc., 47 Fulton Street, New York.

S.A.E. Plans Production Sessions at Hartford

RALPH FLANDERS, president of Jones & Lamson Machine Co., will speak on "Industry and the Job Problem" at the banquet of the national production meeting of the Society of Automotive Engineers, to be held at the Hotel Bond, Hartford, Conn., May 7 and 8.

At the opening session, Tuesday morning, May 7, H. L. Moir, the Pure Oil Co., and Prof. O. W. Boston, University of Michigan, will reveal results of a new study of cutting-fluid recommendations. At the same session L. S. Martz, Micromatic Hone Corp., will show data on producing specified finishes by honing. Tuesday afternoon will be devoted to an inspection trip through the new plant of the Pratt & Whitney division of Niles-Bement-Pond Co.

Wednesday morning will be given entirely to a paper by Val Cronstedt, Pratt & Whitney Aircraft, on special problems in the production of aircraft engines. In the afternoon, a new method of testing and grading fine abrasives will be the topic of E. L. Hemingway, Foster Machine Co. The second presentation will be control of surface finish in machine shop practice by R. F. Gagg, Wright Aeronautical Corp.

The banquet Tuesday evening will be conducted by Warren F. Teigeler, Fafnir Bearing Co. Arthur Nutt, vice-president of engineering, Wright Aeronautical Corp., and president of the society, will share the program with Mr. Flanders. Toastmaster will be E. R. Smith, vice-president and general manager, Seneca Falls Machine Co., vice-president of the society representing its production activity.

Steel's 1939 Tax Bill Is 37% Above 1929

TAXES paid by the steel industry in 1939 reached a total of $141,100,000, payment of which used up more than half of the industry's net earnings remaining after all other expenses of operation had been met.

Last year's total of taxes was 37 per cent greater than the total of $103,000,000 levied on the industry in 1929, although the industry's output last year was 15 per cent below the 1929 tonnage. The 1929 tax bill consumed 21 per cent of the net earnings before taxes for that year, a share considerably less than half the portion taken by taxes in 1939, according to the American Iron and Steel Institute.

The industry's tax bill in 1938 was $98,600,000. After paying that total, the steel industry was "in the red" to the extent of over $14,000,000 for 1938. Steel taxes in 1939 were equivalent to more than $332 per wage earner unemployed during the year, and if paid out in wages would have increased the year's total wages by 22 per cent. Expressed in another way, last year's taxes represented a year's pay for 92,500 workers.

In 1938 the industry's tax bill was equivalent to $254 per worker employed, or, phrased another way, it represented a year's pay for 83,000 wage earners. Out of every dollar received by the steel industry from the sale of its products last year, about 5½c. went to pay taxes.

Output of Steel Welding Wire Reaches New Peak

PRODUCTION of steel welding wire in 1939 rose to the record-breaking total of 183,436,000 lb., according to information received by the American Iron and Steel Institute. Welding wire output in 1939 represented an increase of 56 per cent over the 1938 figure of 117,395,000 lb. and was 18 per cent greater than production in 1937 of 155,310,000 lb., the highest total previously recorded.

Between 1932 and 1939 the production of steel welding wire rose 760 per cent, more than double the increase in total amount of steel produced during the period. Reflecting the more extensive uses of welding processes, particularly by manufacturers of products in which steel is used, more than 5 lb. of welding wire were produced per net ton of finished steel last year, compared with 2.6 tons in 1932.

New Diesel Plane Motor Developed By Buda Co.

CHICAGO—A lightweight diesel airplane motor, which is said to approach gasoline engines in power output per pound, is a recent development of the Buda Co., Harvey, Ill. Test flights have been made in Washington before military officials, and production of the new unit will begin in about 60 days.

Parts for the new airplane engine, which will also be available for commercial use, are interchangeable with similar diesel engines in tanks and other ground equipment. The army already has ordered more than 100 engines for installation in tanks, and details are understood to have been requested by the War Department for an engine adaptable to bombers and pursuit planes.

The Buda Co., which has been making truck and marine diesels, was licensed by the Guiberson Diesel Engine Co., Dallas, to produce the new engine. S. A. Guiberson is the inventor of the engine, which weighs only 653 lb. and develops 310 hp.

Union Wins NLRB Vote Requested By Employers

MILWAUKEE—The CIO-UAW union was the victor in an election held by the National Labor Relations Board in the Delta Mfg. Co. plant, the first instance of an employer here asking for a vote since the NLRB changed its rules to permit this.

Lake Shipments Outside Wheeler-Lea Bill

WASHINGTON—Iron ore and coal shipments on the Great Lakes are not affected by the Wheeler-Lea omnibus transportation bill which was agreed upon in conference last week. The conference report goes to the House on Friday for approval after which the Senate will pass upon it. Both branches are expected to vote for the report after some debate. The bill has White House approval. Since the measure covers common and contract carriers only, privately owned steel and other barges are not affected by it.

Nothing in the measure applies to transportation by water of commodities in bulk in a non-ocean vessel on a normal voyage during which (1) cargo space . . . is used for carrying of three commodities; (2) to vessels passing within waters which are made international for navigation purposes by any treaty to which the United States is a party; (3) to water transportation of liquid petroleum products in bulk.

A general provision also permits the Interstate Commerce Commission to exempt any water carrier upon showing that its operations are not substantially in competition with other water carriers.

Blaw-Knox Orders 34% Ahead of Last Year

PITTSBURGH—Busines of Blaw-Knox Co., exclusive of unconsolidated subsidiaries, for the first quarter of this year was substantially ahead of that for the corresponding 1939 period. Orders booked showed an increase of 34 per cent; shipments were ahead by 66 per cent, and unfilled orders as of April 1 this year were 37 per cent greater than on the same date last year.

Bookings in the first quarter amounted to $4,130,000 as compared with $3,083,000 in the 1939 quarter.

Bids On Chromium Ore Will Be Opened May 7

WASHINGTON — Bids will be opened May 7 by the Treasury Department's Procurement Division for a maximum of 25,000 gross tons of chromium ore. Tenders have been asked on from 1000 to 20,000 tons, f. o. b. Philadelphia Harbor, Pa., or the United States army general depot, New Cumberland, Pa., and on from 1000 to 5000 tons, f. o. b. United States army ordnance depot, Ogden, Utah.

. . . THE NEWS IN BRIEF . . .

Automobile production registers slight but not yet significant downward trend.—**Page 60.**

Tool steel price stability has helped support industry's operating rate, L. Gerald Firth, president, Firth-Sterling Steel Co., says.—**Page 63.**

General Motors Corp. honors 25-year workmen at Hyatt plant, where Alfred P. Sloan, Jr., began in 1897.—**Page 63.**

TNEC is told farm mechanization has lowered production costs, reduced hours of work, and contributed to more attractive farm life.—**Page 64.**

New Deal agencies are endangered by House-approved Logan-Walter bill.—**Page 70.**

Steel industry watches ICC action on Monessen Southwestern Railroad case, a steel company carrier.—**Page 72.**

Allies order $200,000,000 of latest U. S. war planes.—**Page 72.**

Broad revisions of Wagner Act, according to wishes of industry, considered unlikely at this session of Congress.—**Page 74.**

Interest rates on U. S. Steel Corp.'s new bond issue not yet announced.—**Page 77.**

South Africa to lift steel ingot capacity.—**Page 77.**

AFL leaders, following anti-trust indictments against some of their unions, now confer with Assistant Attorney General Thurman Arnold.—**Page 82.**

Two large hardware firms in St. Louis are merged.—**Page 83.**

Electro Manganese Corp. offers research prize—**Page 83.**

Gibson Electric buys new plant at Pittsburgh.—**Page 83.**

Carpenter steel stocked by Dayton warehouse.—**Page 83.**

Detroit section, American Institute of Mining and Metallurgical Engineers, hears address on diffusion in metals.—**Page 83.**

$450,000 order booked by Westinghouse.—**Page 84.**

Bethlehem Steel reports best first quarter in company's history; current operations 74 per cent, new business 75 per cent.—**Page 84.**

Allegheny Ludlum first quarter sales rise 51 per cent.—**Page 85.**

Fruehauf Trailer Co. inaugurates manufacture of stainless steel truck trailers.—**Page 85.**

Steel company earnings in 1939 average 4.2 per cent, compared with 0.5 per cent in 1938, American Iron and Steel Institute reports.—**Page 85.**

American Rolling Mill Co.'s first quarter earnings $1,005,193, compared with $793,479 in like period of 1939.—**Page 85.**

Wheeling Steel Co. subsidiary opens sheet metals roofing warehouse in New Orleans.—**Page 86.**

Southern Ohio industry escapes flood damage as Ohio River recedes.—**Page 86.**

Hisey-Wolf Machine Co. sold to Louis Goldsmith.—**Page 86.**

SECTIONS INDEX

MEETINGS

May 1 to 3—American Society of Mechanical Engineers, spring meeting, Worcester.

May 6 to 10—American Foundrymen's Association, annual meeting and equipment exhibition, Chicago.

May 7 and 8—Society of Automotive Engineers, national production meeting, Hartford.

May 20 to 22—American Gear Manufacturers Association, annual meeting, Asheville, N. C.

May 21 and 22—American Steel Warehouse Association, annual convention, New York.

May 23—American Iron and Steel Institute, annual meeting, New York.

June 3 to 6—Annual international convention and Inform-a-Show, National Association of Purchasing Agents, Cincinnati.

June 17 to 20—American Society of Mechanical Engineers, semi-annual meeting, Milwaukee.

Pittsburgh coal to expand river yards.—**Page 86.**

New Wrinkle, Inc., plans two-day technical production conference at Dayton, Ohio.—**Page 86.**

James D. Maitland, Denver, is elected president of Concrete Reinforcing Steel Institute at annual meeting.—**Page 87.**

Carnegie-Illinois Steel Corp. replaces obsolete soaking pits at Gary plant.—**Page 88.**

CIO-UAW wins election requested by employer at Delta Mfg. Co. plant, Milwaukee.—**Page 90.**

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Blaw-Knox Co.'s orders for first quarter 34 per cent above bookings in corresponding period of 1939.—**Page 91.**

Treasury Department to open bids on 25,000 tons of chromium ore, May 7.—**Page 91.**

Homer Martin, head of AFL-UAW union, resigns labor post.—**Page 94.**

Chronology of Walsh-Healey steel wage case.—Page 98C.

Supreme Court upholds steel wage minimum rates set up by Secretary of Labor; Government orders already placed under Walsh-Healey Act not affected.—**Page 98C.**

Government contracts for iron and steel products in the week ended April 20 total $417,763.—**Page 116.**

Condensed information on all types of welding is given in "The Welding Engineer's Pocket Book."—**Page 116.**

Machine tool buying pace unchanged in the aggregate at Cincinnati. Aircraft business heavy but not up to earlier expectations. Machinery buying expected to follow British munitions purchases in the East. State tax problems vex Chicago dealers.—**Page 118.**

PROFILES—

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Participation Encouraged in Lincoln Foundation Program

SPECIAL awards to encourage participation in the $200,000 industrial progress program sponsored by the James F. Lincoln Arc Welding Foundation, Cleveland, are being offered its employees by the Dravo Corp., Neville Island, Pittsburgh.

In its own award program to be conducted yearly, according to V. B. Edwards, president, Dravo is offering three cash awards for the best papers written by employees and published concerning progressive developments in the plant.

Similar recognition was given by the Dravo Corp. to the four employees who received awards in the 1937-38 Lincoln Foundation Program. In appreciation of the value of the studies to the company the management duplicated the Foundation awards to its participating employees, namely, G. H. Atwood, chief draftsman; G. F. Wolfe, chairman, welding committee; J. F. Smith, welding engineer, and C. P. Streithoff, structural engineer.

As an example of the value of progressive studies, the company recently reported construction of a docking float in record time, attributed largely to data given by employees in previous Foundation papers.

Homer Martin Quits As AFL Auto Union Head

DETROIT—Homer Martin, at one time the leader of virtually every unionized worker in the automobile business, has resigned the presidency of the UAW-AFL, following the overwhelming defeat of his AFL union by the CIO union in a recent poll of General Motors Corp. employees. Mr. Martin, a former minister, who worked for half a year in an automobile plant in Missouri (1933-34), organized one of the early AFL auto unions in 1934 and in 1935 was appointed vice-president of the newly formed International Union, United Automobile Workers of America (AFL). In 1936 he was instrumental in ousting AFL organizers from the union and was elected first president of the UAW-CIO.

Martin, as president, led the auto workers through their organization drive and the nationally famous sit-down strikes of 1937. Factional quarrels eventually led to Martin's defection from the CIO and his return to the AFL as president of a rump union. In announcing his retirement Mr. Martin said that he was tired of his job and that he will turn to private business after a brief vacation.

Robert C. Stanley, president of International Nickel Co. of Canada, Ltd., addressing shareholders at the annual meeting here, stated that capital expenditures estimated at more than $8,325,000 for 1940, will be expended largely in concentrator and smelter improvements to provide capacity for treating up to 30,000 tons of ore per day. First contract in this new enlargement program has been awarded to Canadian Bridge Co., Windsor, Ont., and will require 1500 tons of steel.

Ontario Hydro Electric Power Commission, University Avenue, Toronto, will proceed with construction of 220,000 volt transmission line from the Quebec boundary to Toronto. The undertaking will represent cost of between $6,000,000 and $7,000,000 and service will be available at Toronto within a year.

C. D. Howe, minister of Department of Munitions and Supply, Ottawa, announced that contracts awarded for the three weeks ended April 23, totaled 2419 with value of $12,660,982. These awards were exclusively for the Canadian Government under its war purchasing program, while in addition several millions were also awarded to Canadian companies on behalf of the British Government.

Production Higher

Iron and steel production in Canada for the month of March showed improvement over the shorter month of February, according to figures by Dominion Bureau of Statistics, Ottawa. Pig iron production totaled 91,772 gross tons against 87,032 tons in February and compare with 40,725 tons in March, 1939. For the three months ended with March pig iron production totaled 285,507 tons, an increase of 103 per cent over the 139,716 tons produced in the first three months of 1939.

On March 29 Dominion Steel & Coal Corp., Sydney, N. S., banked one 550-ton blast furnace, which makes two banked stacks in Canada at this time with six furnaces blowing.

Production of steel ingots and direct steel castings for March totaled 157,325 tons compared with 140,343 tons in February and 95,679 tons in March, 1939. For the three months ended with March production totaled 464,165 tons, a gain of 85 per cent over the 251,074 tons in the corresponding period last year.

Greater Industrial Activity in Canada Springs from War Orders

TORONTO — With sharp increase in war orders, steady improvement in export demand for steel and steel products and general betterment that has developed recently in demand for steel for ordinary domestic consumption, primary producers are assured of continued high demand for their products for several months. Secondary plants also have been in receipt of more business recently and operations have been stepped up, with indications that still greater capacity will be called upon in the immediate future.

The increased demand for finished steel also is responsible for large imports from the United States and further orders to American producers are slated for early placing by Canadian steel users.

Ross H. McMaster, president of the Steel Co. of Canada, Ltd., Hamilton, Ont., announced that business on the books of the company shows some contraction from the end of last year, but is sufficiently large to call for a satisfactory rate of operations. He stated "The improved results disclosed in the annual report were due principally to the extraordinary developments following the outbreak of war. Steel production reached figures never previously attained in the history of the company. The ability to cope with the extreme demand was possible only because of the important expenditures made in 1937 for the installation of the new blooming mill. This added capacity provided means of furnishing semi-finished steel to the various finishing departments, all of which were operating at the maximum rate. * * * Two important plant developments have been announced recently as part of the ultimate plan to install a modern strip sheet mill. The first comprises a tin plate dipping plant, now in course of construction, involving an expenditure of approximately $1,000,000. The second is a 110-in. universal plate mill intended to provide the first stand of the subsequent hot strip mill. The plate mill, with slab yard, furnace, mill tables and finishing equipment will involve expenditure of almost $5,000 000. * * * Current operations continue at a high percentage of capacity, supported by a steady demand for domestic needs and supplemented by export business of substantial volume. Unfilled orders, though lower than at the close of last year, still promise to support fair operations.

. . . PERSONALS . . .

E. S. CHAPMAN has been elected vice-president in charge of production of Plymouth Motor Corp., succeeding the late P. C. Sauerbrey, who died in Florida last month. Mr. Chapman has been general works manager of Plymouth, and now, in addition to being a vice-president, has been appointed to the position of assistant general manager. At the same time, A. H. PATERSON, former factory manager, has been named general works manager, succeeding Mr. Chapman, according to D. S. EDDINS, president of Plymouth.

Mr. Chapman joined Chrysler Corp. in 1928 after 13 years in the machine tool industry with Gisholt Machine Co. He has served as staff master mechanic for K. T. Keller; assistant operating manager of the Highland Park plant; operating manager of the New Castle (Ind.) plant, and the Chrysler Amplex division. In the fall of 1935 Mr. Chapman joined Plymouth as general works manager. Mr. Paterson, who served his apprenticeship as a mechanical and marine engineer in Scotland, where he was born, joined the original Dodge Brothers in 1913 and helped to build the original Dodge car. When production got under way on that automobile he served as night general foreman. He advanced rapidly through the time study department, master mechanic's division, body engineering department, accounting department and purchasing department. In 1928 he left Dodge with Mr. Sauerbrey to supervise construction of the present Plymouth factory and became manager of the plant when it was completed.

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L. E. CREIGHTON, who has been manager of bar products sales for Republic Steel Corp., Cleveland, since 1939, has been made vice-president of Rotary Electric Steel Co., Detroit. He was born in New Brighton, Pa., and was in the railroad field before going with the Union Drawn Steel Co. in 1910. He was made vice-president in charge of operations in 1927, vice-president and general manager in 1931 and was transferred to Republic Steel Corp. as manager of bar products sales last year.

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GEORGE B. GARRETT, for many years sales engineer for the Arthur G. McKee Co., Cleveland, has been made manager of iron and steel sales in the United States and Canada. MERRILL COX, formerly assistant chief engineer, has been made assistant to Mr. Garrett.

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FRANK ARMSTRONG, partner in Pickands, Mather & Co., Cleveland ore, coal and shipping company, was elected president of Interlake Iron Corp. at the annual meeting in New York recently. He succeeds the late C. D. Caldwell.

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JOHN S. ANDREWS has announced his resignation as vice-president in charge of sales of the Rotary Electric Steel Co., Detroit, and has not announced future plans.

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DONALD L. DERROM has been elected vice-president in charge of manufacturing for Apex Electrical Mfg. Co., Cleveland, succeeding S. W. TAYLOR, who has retired. G. B. SCHUYLER has been named vice-president in charge of sales.

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LIEUT. COL. JOSEPH D. ARTHUR, Army engineer in charge of the district office at Huntington, W. Va., has been made acting district engineer at Pittsburgh, succeeding LIEUT. COL. W. E. R. COVELL, who has resigned to go into private business. Col. Arthur will continue in charge at Huntington also.

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E. F. ROBERTS, formerly vice-president of Packard Motor Car Co., has been elected a director of the L. A. Young Spring & Wire Corp., Detroit, replacing F. J. BECKLEY, treasurer.

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ERNEST KIRSCHKE and R. F. BURTCH have been elected to the board of directors of the Graham-Paige Motors Corp.

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HAROLD F. PITCAIRN has been elected president of the Southern Alkali Corp., a subsidiary of Pittsburgh Plate Glass Co., Pittsburgh, succeeding HUGH A. GALT, who retired recently. Mr. Pitcairn, a director of Pittsburgh Plate Glass, is also president of the Autogiro Co. of America and proprietor of the Pitcairn Autogiro Co.

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R. F. HEATH, who has been covering the Houston, Tex., territory for Manning, Maxwell & Moore, Inc., Bridgeport, Conn., has been transferred to the New Orleans territory, succeeding J. SCHUYLER.

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GEORGE P. NEEDHAM, who has been identified with the Cowles Detergent Co., Cleveland, for the past several

E. S. CHAPMAN, vice-president in charge of production of Plymouth Motor Corp.

A. H. PATERSON, Plymouth's general works manager.

years, has been appointed representative for the company in the Ohio territory. He will make his headquarters in the home office.

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S. F. NEWMAN, who has been actively associated with the machine tool industry for many years, has been elected president of the Landis Tool Co., Waynesboro, Pa., and M. A. HOLLENGREEN has been advanced from assistant general manager to vice-president.

Mr. Newman was originally connected with the Landis Tool Co. between the years 1899 to 1908. Then he went with the Landis Machine Co., with which he served in an executive capacity for many years, for part of the time as vice-president. He is on the board of directors of the National Machine Tool Builders Association.

Mr. Hollengreen joined the Landis Tool Co. in 1936 as assistant general manager. For 10 years before that he was assistant chief engineer of the Landis Machine Co.

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FRANK J. SCHUMAN has been appointed works manager of the Federal Machine & Welder Co., Warren, Ohio. He is a graduate of Lehigh University in mechanical engineering and before joining the Federal company was works manager of the Standard Tube Co., Detroit. He was at one time plant superintendent of the S. R. Dresser Mfg. Co., Bradford, Pa.

CHARLES J. MARTIN, who has been identified since 1934 with the Ex-Cell-O Corp., Detroit, in a sales capacity, has been made chief engineer of the Federal Machine & Welder Co. He was assistant chief engineer of the Ford Motor Co. from 1923 to 1934. Besides being a graduate mechanical engineer, Mr. Martin has spent considerable time as a machinist and tool maker in automobile plants.

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JOHN D. MORAN, heretofore superintendent of planning for the Chrysler Corp., has been appointed to a similar post with the Crosley Corp., Cincinnati. He has been identified with the automotive industry for the past 15 years. He will have charge of all materials moving into the plant, through their processing and into dealers' hands. This includes all products manufactured by Crosley.

A. G. BRUCK, who has been connected with the refrigerator production division of the Crosley Corp. since 1931, has been appointed manager of the production division of the corporation. He started with Crosley, laying out processing schedules and the use of tools and equipment. He also had charge of the model shop. Later he was given charge of the entire assembly of refrigerator units and then of refrigerator production. Recently he was in charge of all operations at the Richmond, Ind., plant.

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BOB KOCH has been announced as the manager of a new branch office of Morse Chain Co. at 1418 Polk Street, Houston, Tex. Mr. Koch has been assistant sales manager at the home office of the company, Ithaca, N. Y., for the last five years and has been with the company 13 years. The Houston office will serve the Southwest.

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WALTER A. HAMILTON, formerly general manager of the El Segundo, Cal., division of the Douglas Aircraft Co., has been placed in charge of the newly-established division of materiel of the company. ERIC SPRINGER, for many years test pilot and heretofore assistant manager of the El Segundo factory, has been promoted to the post of manager, and HARRY L. WILLIAMS, superintendent of the plant, has been made assistant manager.

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GEORGE L. MCCAFFREY, of the Owen-Dyneto division of the U.S.L. Battery Corp., Syracuse, N. Y., has been elected president of the Purchasing Agents' Association of Syracuse and central New York. Other officers elected include: Second vice-president, CARL J. KUCKHOFF, Syracuse Stamping Co.; director, D. A. BREWER,

S. F. NEWMAN, new president of the Landis Tool Co.

M. A. HOLLENGREEN, who has been advanced to the vice-presidency of Landis Tool.

FRANK J. SCHUMAN, works manager of the Federal Machine & Welder Co.

Brewer-Titchener Corp.; treasurer, M. E. JENNINGS, Selflock Screw Products; national director, C. H. KISSEL, Goulds Pumps, Inc.

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B. C. FIRMIN has been appointed representative in the Cleveland area for the W. S. Rockwell Co., New York. He will make his headquarters in the Commonwealth Building Annex, Pittsburgh, and will continue to cover the western Pennsylvania area.

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JOHN R. FULLER has been appointed general purchasing manager of the

CHARLES J. MARTIN, chief engineer of Federal Welder

Hygrade Lamp division of the Hygrade Sylvania Corp., Salem, Mass.

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B. D. CLASSEY, Waukesha, Wis., was elected president of the Wisconsin chapter of the American Foundrymen's Association in its annual meeting held at the Schroeder Hotel, Milwaukee. Other officers chosen were: Vice-president, A. C. ZIEDELL, Oshkosh; secretary, HOWARD WALDRON, Milwaukee; treasurer, R. F. JORDAN, Milwaukee; and directors, DAVID ZUEGE and FRED C. PRITZLAFF, both of Milwaukee.

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R. D. THOMAS, president of Arcos Corp., Philadelphia, gave an address on "Stainless Weld Metal and the Welding of Stainless Steels" before the Milwaukee section of the American Welding Society.

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GEORGE A. BLACKMORE, president and director, Westinghouse Air Brake Co. and the Union Switch & Signal Co., has been elected chairman of the board of the Duff-Norton Mfg. Co.,

JOHN D. MORAN, superintendent of planning for the Crosley Corp.

Pittsburgh, succeeding the late Thomas A. McGinley. Mr. Blackmore is also a director of the A. M. Byers Co., Pittsburgh Screw & Bolt Corp., Pittsburgh Coal Co., Flannery Bolt Co., Bendix-Westinghouse Automotive Brake Co., Cardwell Westinghouse Co., Westinghouse Brake & Signal Co., Ltd., of London, Canadian-Westinghouse Co., of Hamilton, Ont., Westinghouse Electric & Mfg. Co., Mellon National Bank, National Association of Manufacturers, and the Pittsburgh Chamber of Commerce.

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J. G. GIDLEY, who has been identified with the General Electric Co., Schenectady, since 1915, has been appointed manager of sales, Schenectady section, turbine division, succeeding R. S. Neblett, who has been assistant manager of the turbine division since July, 1939. Mr. Gidley entered the general engineering laboratory of the company after his graduation from Union College. He was soon transferred to the test department and was placed in charge of turbine tests in 1918. Later he joined the turbine engineering department and became associated with turbine sales in 1920.

A. G. BRUCK, manager of the production division of Crosley.

In the next few years Mr. Gidley saw service in the turbine commercial sections of Schenectady, Lynn, and Cincinnati, returning to Schenectady in 1926.

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SIR WILLIAM FIRTH, chairman of Richard Thomas & Co., Ltd., London, England, has relinquished the chairmanship. He has been associated since an early age with the tin plate industry in South Wales and was a partner in the Richard Thomas com-

BOB KOCH, manager of the new Houston branch office of Morse Chain Co.

pany before he was made chairman and managing director of the company and all its subsidiaries.

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O. L. BARD, for the past 17 years secretary of Michigan Tool Co., and identified with the company almost since its inception, has been elected president and treasurer. MARVIN R. ANDERSON has been elected vice-president and ARVID LUNDELL secretary.

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JOSEPH H. CARTER has been appointed operating vice-president, Sharon Steel Corp., Sharon, Pa. Mr. Carter holds a similar position with the Pittsburgh Steel Co., Pittsburgh. J. REID EVANS has been appointed treasurer of Sharon Steel and A. J. WATSON has been made secretary.

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MALCOLM F. MCCONNELL has been appointed manager of technical development, Carnegie-Illinois Steel Corp., Pittsburgh. JAMES W. KINNEAR, JR., has been made assistant manager of operations, Pittsburgh district; HOWARD G. MCILVRIED has been made general superintendent at Homestead; and LAWRENCE S. DAHL has been appointed general superintendent of Irvin works.

Mr. McConnell has been general superintendent of Homestead works since 1933 and has been with the U. S. Steel Corp. since 1905. He formerly was general superintendent at the Mingo Junction, Ohio, works of the former Carnegie Steel Co.

Mr. Kinnear has been with Carnegie-Illinois since 1923, at which time he was in the open-hearth department at Homestead. He was made assistant superintendent of that department in 1928 and assistant chief metallurgist in 1932. He has been assistant general superintendent at Homestead since 1937.

Mr. McIlvried has been connected with U. S. Steel subsidiaries since 1902 and has been general superintendent of the Irvin works since its construction in 1938. He formerly was chief engineer of the American Sheet & Tin Plate Co. from 1931 to 1933. In 1936 he was made assistant manager of operations, Chicago district, and went to Pittsburgh a year later during construction of the Irvin works.

Mr. Dahl became associated with subsidiary companies of U. S. Steel at Gary, Ind., in 1927, and in 1936 became superintendent of the hot strip mills there. He was appointed assistant general superintendent of the Irvin works on Nov. 1, 1937.

. . . OBITUARY . . .

HENRY F. HOLLOWAY, for many years New York sales manager for the Jones & Laughlin Steel Corp., retiring from the service of the company in 1920, died at his home in Montclair, N. J., April 19, aged 83 years. In his early business life he was employed at the Akron Iron Co.'s blast furnace at Buchtel, Ohio, in the Hocking Valley. Later he was secretary of the Columbus & Hocking Coal & Iron Co. at Columbus, Ohio, and in the late nineties was manager of the Akron Iron Co.'s rolling mill at Akron, Ohio. He was a founder of the First National Bank & Trust Co., Montclair, and for nearly 30 years a director. In 1910 and 1911 he represented Essex County in the New Jersey Assembly. In the World War he served at Washington on the committee of steel company representatives which cooperated with the Government in facilitating production and delivery of war steel.

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CHARLES H. JOHNSON, executive vice-president of the Gisholt Machine Co., Madison, Wis., died from a heart attack in his home there April 23. He was born in Davis, Ill., the son of a blacksmith, and began to work for Gisholt while a youth in his teens. In 1904 he established European headquarters for his firm in Cologne, Germany, and at the beginning of the World War he went to Russia. He later returned to Madison and was made vice-president and a director. He was 58 years of age.

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ARTHUR CROMIE, superintendent of export for the Penberthy Injector Co., Detroit, was buried April 26. Mr. Cromie, born in Utica, Mich., 58 years ago, had lived in Detroit for 50 years.

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WILLIAM D. FRANCIS, chief of maintenance of Plant No. 1 of the Bohn Aluminum & Brass Corp., Detroit, for 15 years, was buried April 25. Mr. Francis died suddenly at his home. He was a native of Detroit.

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HUGH A. GILLIES, 58 years old, vice-president in charge of sales of the American Brakeblok division of the American Brake Shoe & Foundry Co., was buried in Denver, Colo., on April 29. Mr. Gillies died in New York of a cerebral hemorrhage while on a convention trip. A native of McComb City, Miss., he went to Detroit in 1926 from Denver where he also had been an executive of the Brakeblok division. Earlier he had been a master mechanic on a railroad in Mexico and a mining engineer in Colorado.

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ALFRED L. HOHLFELDER, 42, vice-president and factory manager, F. Hohlfelder & Co., Cleveland foundry supply manufacturers, died April 23.

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ALPHONSE JOSEPH LAVOIE, formerly research engineer with General Motors Corp., Cord Corp. and Auburn Automobile Co., but president and general manager of the Lavoie Corp. since 1934, died April 24 at Defiance, Ohio. He was born in 1876 at Longueuil, Que.

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H. D. ELLER, who for many years was engaged in sales departments of steel companies, has been elected president of the K & S Metal Supply, Inc., 1182 Flushing Avenue, Brooklyn, jobber of steel products. GEORGE J. STROBER has been elected vice-president.

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WALTER J. KOHLER, chairman of the Kohler Co., and Republican Governor of Wisconsin in 1929-1930, died at his home in Kohler, Wis., on April 21, aged 65 years. Mr. Kohler was president of the company from 1905 to 1937, when he became chairman of the board. His political career began in 1928 when he was elected delegate to the Republican national convention. That same year he was drafted to run for Governor and was elected. He sought reelection in 1930 and ran again in 1932, but was defeated both times. Mr. Kohler was vice-president of the National Association of Manufacturers, a regent of the University of Wisconsin and a trustee of Lawrence College, Appleton, Wis. In 1934 he was awarded the national fellowship of the Society of Arts and Sciences for the construction of Kohler, Wis., as a model industrial town.

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W. HARVEY LUCAS, until his retirement two years ago superintendent of Walker & Pratt Mfg. Co., Watertown, Mass., stove manufacturer, died suddenly while walking near his home in that town. He was 72 years old and at the time of his death was town welfare agent.

Supreme Court Upholds Steel Wage Rates Set By Labor Department

WASHINGTON — The Secretary of Labor's steel wage determination under the Walsh-Healey Public Contracts Act, which has been stayed since March, 1939, by court injunction, will become effective again as a result of the Supreme Court's decision on Monday. In an eight to one decision written by Associate Justice Hugo Black, the court held that the seven small steel companies which had contested the steel wage order had no standing in court, that their rights had not been invaded by the Government's order, but that on the contrary their action could be construed as an attempt "through judicial action to interfere with the manner in which the government may dispatch its own internal affairs." Associate Justice Reynolds dissented.

The immediate effect of the decision will be to require the steel company litigants to agree to pay the minimum wage rates prescribed by the Secretary of Labor if they would continue to bid for Government business. Existing contracts remain unaffected by the order and no company will be required to pay back wages because the Circuit Court of Appeals for the District of Columbia did not require bond or security to protect the wage standards laid down by the Secretary.

CHRONOLOGY OF WALSH-HEALEY STEEL WAGE CASE

JULY 11, 1938.	Steel companies given notice of intent to fix minimum steel wages for Government contractors.
JULY 24-26 ...	First public hearings held.
NOV. 5	Wage recommendations announced by Public Contracts Board, which recommended two wage districts with minimum rates of 62.5c. an hour in 36 Northern states and 45c. in 12 Southern states.
DEC. 20	Assistant Secretary of Labor heard arguments and received briefs in opposition to the wage recommendations.
JAN. 16, 1939..	Former recommendations revised by Labor Department which proposed to divide the industry into six localities with four minimum wage areas ranging from 45c. in the South to 62.5c. in the North. Eastern mills were grouped with those in Pittsburgh, Youngstown and Chicago and subjected to a 62.5c. minimum rate. Effective date of the order fixed at Jan. 31, 1939.
JAN. 31	Postponed effective date to March 1, 1940.
MARCH 1	Temporary injunction granted by Federal District Court on petition of small Eastern mills. Case dismissed, injunction terminated several days later.
MARCH 19	Steel companies appeal to the Circuit Court of Appeals. Temporary restraining order continued.
OCT. 8	Circuit Court rules in favor of steel companies. Restraining order continued.
DEC. 16	Government petitions Supreme Court for review of writ of certiorari
FEB. 4	Supreme Court agreed to review decision.
APRIL 29	Supreme Court decision upholding steel wage minimums.

Locality Passed Over

The Circuit Court, when it ruled in favor of the steel company litigants last October, made much of the interpretation of the term "locality" in the Secretary's steel wage determination, holding that the action went "so far beyond any possible proper application of the words as to defeat its meaning and to constitute an attempt arbitrarily to disregard the statutory mandate." The Supreme Court touched only briefly on this issue, pointing out that it was "not enough" that the Secretary is charged with an erroneous interpretation of the term "locality." For her construction of the statute, she is responsible only to her superior executive and legislative authority, the court said, adding that "respondents have no standing in court to enforce that responsibility or to represent the public interest in the Secretary's compliance with the act."

The decision lays down the general rule that the Government has virtually unlimited power in laying down stipulations to be adhered to by contractors. It pointed out that the competitive bidding statutes were not enacted for the protection of sellers and conferred no enforceable rights upon prospective bidders.

"Acting through its agents as it must of necessity," the court said, "the Government may for the purpose of keeping its own house in order lay down guide posts by which its agents are to proceed in the procurement of supplies, and which create duties to the Government alone. It has done so in the Public Contracts Act. That act does not depart from but instead embodies the traditional principle of leaving purchases necessary to the operation of our Government to administration by the executive branch of government, with adequate range of discretion free from vexations and dilatory restraints at the suits of prospective or potential sellers.

Break With Practice

"It was not intended to be a bestowal of litigable rights upon restraint upon those desirous of selling to the Government; it is a self-imposed restraint for violation of which

the Government—but not private litigants—can complain . . .

"Judicial restraint of those who administer the Government's purchasing would constitute a break with settled judicial practice and a departure into fields hitherto wisely and happily apportioned by the genius of our policy to the administration of another branch of Government."

The necessity for leaving the restraint of the Government's purchasing agents to Congress was emphasized at several points in the decision. Criticizing the lower court's decision in favor of the steel companies, and characterizing it as "sweeping," the opinion by Associate Justice Black said that "the declared policy of the Congress was abandoned under judicial compulsion and contracts without a minimum wage stipulation have been awarded for more than $65,000,000 worth of iron and steel products since the injunction issued."

Business Would Object

The decision added that the Government's purchasing machinery should be allowed to function unhampered, and that the courts "should not subject purchasing agencies of Government to the delays necessarily incident to judicial scrutiny at the instance of potential sellers." A like restraint applied to purchasing by private business would be widely condemned as an intolerable business handicap, the opinion said.

Of the steel company litigants, the court said that in effect they sought "through judicial action to interfere with the manner in which the government may dispatch its own internal affairs"; that the contested action did not invade private rights in a manner amounting to a tortious violation; and that the impropriety of judicial interpretation of law at the instance of those who show no more than a mere possible injury to the public is well established.

While few officials would hazard a guess on how imposition of the steel wage order would affect Government steel bids, it was recalled that during the short period when the Secretary of Labor's ruling was effective early in March, 1939, the bidding on steel was confined to two bidders. As only one of these could produce steel within the whole range required, the bidding was limited on some items to one bid. After the steel wage order was suspended by court injunction, the Navy records show that bidding procedure regained normalcy.

Moreover, Navy records show that bidding fell of markedly after passage of the Walsh-Healey Act in 1936. Bids dropped from an average of 7.49 bids per lot in 1936 to 5.84 bids per lot in 1937, a drop of 25 per cent. The rate of bidding prior to the law never has been regained.

Wage Ruling Effective When Court Injunction Is Vacated

WASHINGTON — Application to the Eastern geographical area of the steel industry of the minimum hourly wage of 62½c. will become effective when the Circuit Court of Appeals for the District of Columbia vacates its injunction against the wage determination. The Department of Labor has indicated that it will ask immediate suspension of the injunction. The injunction will be suspended by mandate to the Circuit Court. Under the ordinary practice the Supreme Court issues such a mandate 25 days from the day of its decision.

In the present instance, however, it is expected that Solicitor Gerard D. Reilly of the Department of Labor will ask Solicitor General Francis Biddle to request the Supreme Court to issue the mandate at once. It is the position of the Department of Labor that the period for application of the 62½c. wage should be shortened by an immediate mandate in view of the fact that the injunction has been in effect for a little more than a year. Bids on Government contracts for $10,000 or more thereupon would in the absence of exemption carry a stipulation requiring eastern steel producers to pay a minimum wage of 62½c., a demand for which originated in the CIO's Steel Workers Organizing Committee. Its drive was particularly directed at the Bethlehem Steel Co. whose workers the union has been unable to organize.

Affected Companies May Limit Pay Advance to Common Labor

STEPS to be taken by Eastern and Southern steel companies affected by the Supreme Court's April 29 ruling on minimum steel wages were not clear at midweek immediately following the court's decision. Among the possible developments are:

1. Limitation of the wage increase ordered by the Department of Labor (62½c. an hour is the minimum rate for Eastern mills) to common labor without regard for prevailing wage differentials. This would affect from 12,000 to 14,000 men.

2. Allocation of Government orders awarded under the Walsh-Healey Act to specific mills in which minimum wages set up by the Department of Labor would be observed.

3. Giving up of Government business by some companies. (The decision does not apply to orders already placed.)

4. Attempts by some producers to win exemptions from the wage minimums stipulated by the Government on grounds that to pay such wages would interfere with the flow of material essential to national defense.

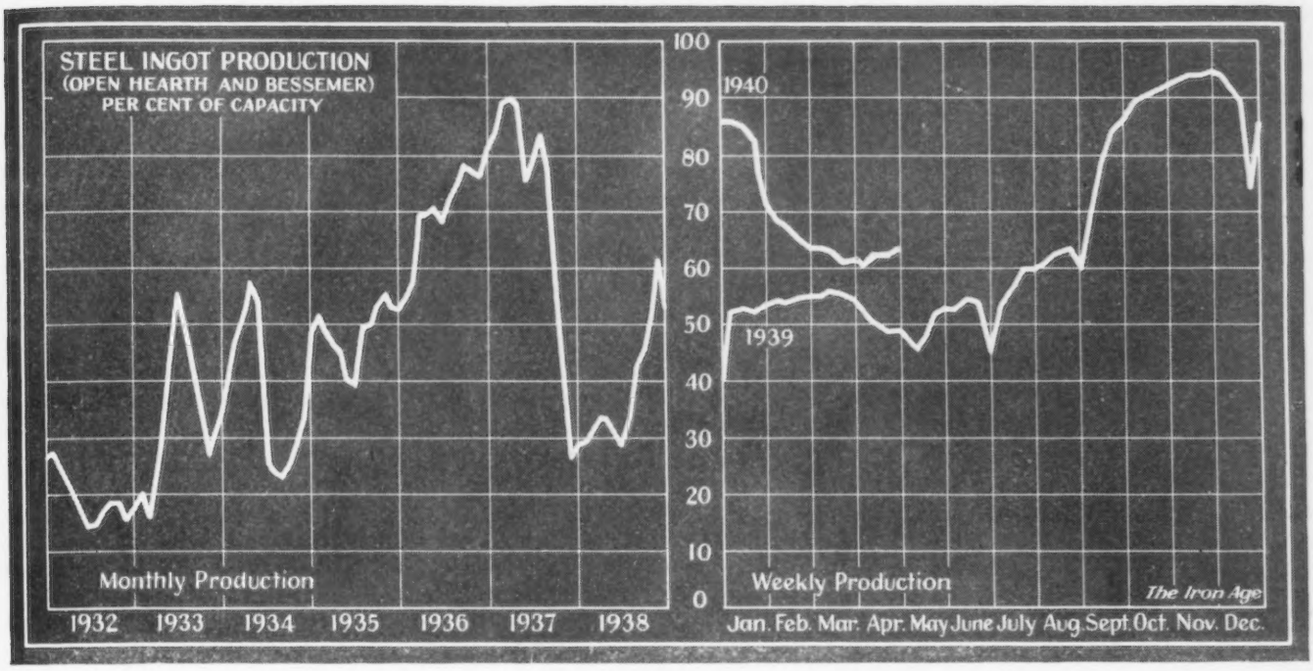
5. Adoption of a form of incentive pay to compensate higher paid employees for the narrowing of the differential between their pay rates and rates of common labor.

Some observers saw in the wage decision effects reaching beyond the steel industry, with non-steel employers owning plants in areas in which the affected steel plants are operated being forced to increase wages to conform with the steel wage minimums.

Union Leader Predicts Pay Increase for 200,000

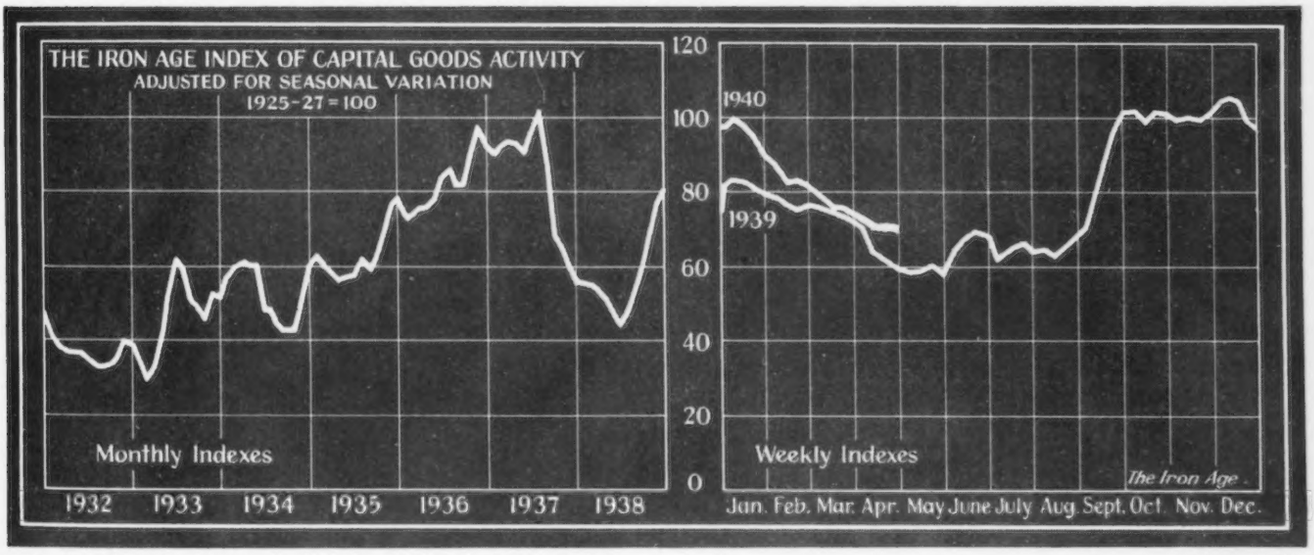
WASHINGTON—Lee Pressman, CIO general counsel, said the Supreme Court decision was a "clear-cut vindication of the union's long struggle to make 'Little Steel' conform to the laws of the United States." He said the decision would place "Little Steel" on a competitive basis for Government contracts with other steel companies now under contract to the Steel Workers Organizing Committee, and would result in benefits to 200,000 steel workers.

Ingot Rate Rises One Point to 63% of Capacity



District Ingot Production, Per Cent of Capacity	Pittsburgh	Chicago	Valleys	Philadelphia	Cleveland	Buffalo	Wheeling	Detroit	Southern	S. Ohio River	Western	St. Louis	Eastern	Aggregate
CURRENT WEEK..	59.0	59.5	53.0	73.0	67.0	52.5	92.0	73.5	81.5	55.0	63.0	39.5	57.0	**63.0**
PREVIOUS WEEK..	57.0	57.0	49.0	69.0	67.0	47.0	64.0	73.5	81.5	59.0	70.0	39.5	50.0	**62.0**

Softness in Pittsburgh Series Lowers Index



A PARTICULARLY severe drop in the Pittsburgh series, caused largely by flood conditions, was responsible for a decline of 0.9 point in THE IRON AGE index of capital goods activity for the week ended April 27. Minor changes were recorded by the other components of the index, but these changes largely cancelled each other. The decrease in automobile output was counter to the seasonal trend, while the improvement in carloadings of lumber products was slightly better than seasonal experience. The construction and steel series were relatively unchanged in the week. The present position of the index is the lowest reached since the second week of September, 1939.

	Week Ended Apr. 27	Week Ended Apr. 20	Comparable Week 1939	Comparable Week 1929
Steel ingot production[1]	79.7	79.8	61.1	131.0
Automobile production[2]	82.3	84.1	70.3	127.3
Construction contracts[3]	56.7	56.6	75.9	130.9
Forest products carloadings[4]	56.9	55.4	50.4	125.0
Production and shipments, Pittsburgh District[5]	79.5	83.8	48.3	125.1
Combined index	**71.0**	**71.9**	**61.2**	**127.9**

Sources: [1] THE IRON AGE; [2] Wards Automotive Reports; [3] *Engineering News-Record;* [4] Association of American Railroads; [5] University of Pittsburgh. The indexes of forest products carloadings and activity in the Pittsburgh area reflect conditions as of the week ended April 20. Other indexes cover the week of April 27.

. . . SUMMARY OF THE WEEK . . .

. . . Sheet and strip price cuts rescinded as of May 1.

o o o

. . . Consumer contracting substantial, but below May, 1939, volume.

o o o

. . . Ingot production higher in several districts, scrap prices move up.

ALONG with the restoration of the sheet and strip prices that prevailed prior to April 11 is an upward trend in steel ingot production in several of the major districts and a strengthening of scrap prices particularly at Pittsburgh, Chicago and Detroit, resulting in the third consecutive advance in THE IRON AGE scrap composite price to $16.38, a total gain of 34c. from the low point of early April.

A gain of one point to 63 per cent in operations for the industry as a whole is indicated for this week. The Pittsburgh district has gained two points to 59 per cent, the Chicago district two and a half points to 59½ per cent, the Youngstown district four points to 53 per cent, while other districts have either gained or have held last week's rate with the exception of Southern Ohio, where flood waters have caused a temporary shutting down of some furnaces.

Strengthening of scrap prices is largely the result of higher bids by dealers, but at Detroit and Buffalo there are signs of an export movement of scrap to Canada of both steel-making and cast iron grades.

THE sudden withdrawal of the low sheet and strip prices, which became effective April 11, was a complete surprise to the trade, as no advance intimation had been given that such action would be taken so quickly. As was expected, however, the bargain prices were rescinded coincident with an announcement of third quarter prices. The announcement covering a five-month period from May 1 to Sept. 30 came much sooner than is usual in making quarterly announcements.

As buyers were given an opportunity to cover between the date of the announcement, April 25, and May 1 at the $4 a ton concession, there has been a substantial volume of commitments, though the total does not approach the heavy volume which followed the break in sheet and strip prices in May, 1939. All mills are insisting that specifications against blanket commitments shall be in their hands in time for rolling and shipment by June 30. Thus, if commitments are fully specified, sheet and strip mill operations will be at a higher rate in May and June.

Although galvanized sheets were not included in the April 11 price cut, there was considerable selling of this grade late last week and early this week at a $4 a ton concession, but this lower price was also withdrawn as of May 1.

Pacific Coast prices on all steel products have been advanced $1 a ton, effective May 1, to compensate for an increase in ocean freight rates of that amount.

THE action taken on sheet and strip prices is expected to steady the price situation on some other steel products, but there is still a good deal of weakness in certain warehouse-handled products, such as pipe, reinforcing bars and wire nails. Nails have been sold at $2 a ton below published prices.

While the initial effect of recent price cuts was to retard the slowly rising trend of orders, the betterment of the past week raised total sales for April above the March level. Some steel companies have recently booked more than their shipments, while others have come close to their shipping volume. The variations are due largely to types of products. Much of the sheet and strip volume put on the books in recent days will not be counted as orders until definite specifications are received.

Export business still accounts for a substantial part of steel companies' orders, though April sales were probably below those of March. Inquiries are plentiful, but foreign buyers are a little slower in closing.

Foreign interest in pig iron is more active. Pending inquiries total about 100,000 tons. Recent orders include 25,000 tons for Italy and 15,000 tons for Great Britain. Shortage of ship space is handicapping the closing of business.

MARCH exports of iron and steel totaled 457,052 gross tons against 436,585 tons in February and 162,098 tons in March, 1939. The first quarter shipments totaled 1,289,701 tons compared with 431,663 tons in the same period last year. All of the leading foreign markets took more iron and steel than in February. Scrap exports, however, have declined. The March total was 206,928 tons against 234,716 in February. The first quarter total was 629,101, 17.7 per cent below the total for the 1939 first quarter.

The first large shell order placed by the British in the United States has been awarded to the American Car & Foundry Co. The contract will require 30,000 tons of shell steel.

Shipbuilding contracts continue to be placed. Three ships awarded to Eastern shipyards, one each for the Standard Oil Co., the Pan-American Petroleum & Transport Co. and the International Freighting Corp. (DuPont) will take about 15,000 tons of steel.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Apr. 30, 1940	Apr. 23, 1940	Apr. 2, 1940	May 2, 1939
Rails, heavy, at mill	$40.00	$40.00	$40.00	$40.00
Light rails: Pittsburgh, Chicago, Birmingham	40.00	40.00	40.00	40.00
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	34.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	40.00	40.00	40.00	40.00
Wire rods: Nos. 5 to 9/32 in., Pittsburgh, Chicago, Cleveland, cents per lb.	2.00	2.00	2.00	1.92
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	1.90

Finished Steel

Cents Per Lb.:				
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.15	2.15	2.15	2.25
Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont	2.10	2.10	2.10	2.10
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham	2.10	2.10	2.10	2.10
Alloy bars: Pittsburgh, Buffalo, Bethlehem, Massillon or Canton	2.70	2.70	2.70	2.80
Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary	2.65	2.65	2.65	2.70
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	1.90	1.90	2.10	2.15
Cold rolled strip: Pittsburgh, Cleveland, Youngstown	2.60	2.60	2.80	2.95
Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham	3.50	3.50	3.50	3.50
Hot rolled sheets: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown	1.90	1.90	2.10	2.15
Cold rolled sheets: Pittsburgh, Chicago, Gary, Buffalo, Youngstown, Cleveland, Middletown	2.85	2.85	3.05	3.20
Wire nails: Pittsburgh, Chicago, Cleveland, Birmingmingham	2.55	2.55	2.55	2.45
Plain wire: Pittsburgh, Chicago, Cleveland, Birmingham	2.60	2.60	2.60	2.60
Tin plate, 100 lb. base box: Pittsburgh and Gary	$5.00	$5.00	$5.00	$5.00

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Pig Iron

Per Gross Ton:				
No. 2 fdy., Philadelphia	$24.84	$24.84	$24.84	$22.84
No. 2, Valley furnace	23.00	23.00	23.00	21.00
No. 2, Southern Cin'ti	23.06	23.06	23.06	21.06
No. 2, Birmingham	19.38	19.38	19.38	17.38
No. 2, foundry, Chicago†	23.00	23.00	23.00	21.00
Basic, del'd eastern Pa.	24.34	24.34	24.34	22.34
Basic, Valley furnace	22.50	22.50	22.50	20.50
Malleable, Chicago†	23.00	23.00	23.00	21.00
Malleable, Valley	23.00	23.00	23.00	21.00
L. S. charcoal, Chicago	30.34	30.34	30.34	28.34
Ferromanganese, seab'd carlots	100.00	100.00	100.00	80.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh.	**$16.75**	$16.25	$16.25	$14.75
Heavy melting steel, Phila.	16.75	16.75	16.75	15.25
Heavy melting steel, Ch'go	**15.625**	15.375	15.25	12.75
Carwheels, Chicago	**17.75**	17.00	16.75	12.50
Carwheels, Philadelphia	20.25	20.25	20.25	16.00
No. 1 cast, Pittsburgh	17.75	17.75	17.75	15.25
No. 1 cast, Philadelphia	20.25	20.25	20.25	16.50
No. 1 cast, Ch'go, (net ton)	15.75	15.75	13.25	11.75

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$4.00	$4.00	$4.00	$3.75
Foundry coke, prompt	5.25	5.25	5.25	4.75

Non-Ferrous Metals

Cents per Lb. to Large Buyers:				
*Copper, electrolytic, Conn.	11.50	11.50	11.50	10.25
Copper, lake, New York	11.50	11.50	11.50	10.25
Tin (Straits), New York	47.25	47.50	45.875	49.25
Zinc, East St. Louis	5.75	5.75	5.75	4.50
Zinc, New York	6.14	6.14	6.14	4.89
Lead, St. Louis	5.10	5.10	5.05	4.60
Lead, New York	4.95	4.95	4.85	4.75
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	14.00

*Mine producers only.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
April 30, 1940	2.211c. a Lb.	$22.61 a Gross Ton	$16.38 a Gross Ton
One week ago	2.211	22.61	16.13
One month ago	2.261	22.61	16.08
One year ago	2.286	20.61	14.25

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1940	2.261c., Jan. 2	2.211c., Apr. 16	$22.61, Sept. 19	$20.61, Sept. 12	$17.67, Jan. 2	$16.04, Apr. 9
1939	2.286c., Jan. 3	2.236c., May 16	23.25, June 21	19.61, July 6	22.50, Oct. 3	14.08, May 16
1938	2.512c., May 17	2.211c., Oct. 18	23.25, Mar. 9	20.25, Feb. 16	15.00, Nov. 22	11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	19.73, Nov. 24	18.73, Aug. 11	21.92, Mar. 30	12.92, Nov. 10
1936	2.249c., Dec. 28	2.016c., Mar. 10	18.84, Nov. 5	17.83, May 14	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	17.90, May 1	16.90, Jan. 27	13.42, Dec. 10	10.33, Apr. 29
1934	2.118c., Apr. 24	1.945c., Jan. 2	16.90, Dec. 5	13.56, Jan. 3	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	14.81, Jan. 5	13.56, Dec. 6	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	15.90, Jan. 6	14.79, Dec. 15	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	18.21, Jan. 7	15.90, Dec. 16	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.71, May 14	18.21, Dec. 17	15.00, Feb. 18	11.25, Dec. 9
1929	2.236c., May 28	2.192c., Oct. 29			17.58, Jan. 29	14.08, Dec. 3

. . . THIS WEEK'S MARKET NEWS . . .

STEEL OPERATIONS

. . . Trend is upward, nearly all districts running at higher rates

STEEL ingot production is higher on holding its own this week in nearly all districts, excepting SOUTHERN OHIO, which is affected by high water.

The PITTSBURGH district has gained two points to 59 per cent, the CHICAGO district is up two and a half points to 59½ per cent, the YOUNGSTOWN district is four points higher at 53 per cent, the EASTERN PENNSYLVANIA district is higher at 73 per cent, while the BUFFALO and WHEELING-WEIRTON have also gained. The upward adjustment for the last-named district is due primarily to a capacity realinement of that district caused by the official abandonment of one steel plant.

NEW BUSINESS

. . . April volume generally better than that of March

APRIL bookings at PITTSBURGH are substantially ahead of the volume placed in May, owing to export demand and, in the latter part of April, to the forward buying in the sheet and strip markets. Actual specifications against flat-rolled steel orders placed prior to May 1 will swell May tonnages substantially, although a repetition of last year is not expected and steel mills claim adherence to prompt shipment by June 30 on low-priced tonnage will be demanded. It cannot be denied that much of the flat rolled tonnage taken out by customers in May and June will be at the expense of July, August and September order books. The restoration of sheet prices, while driving in moderate tonnages, had nowhere near the effect of the same type of action taken last May.

At the start of May, production and orders for steel are improved at CLEVELAND and shipments are beginning to climb after declining for two months. Withdrawal of bargain sheet and strip prices, which failed to produce as much tonnage as previous price wars, finds producers anxious to enforce the June 30 deadline on shipments. As the situation stands now, most large automobile producers indicate they will be unable to specify 1941 model sizes in time to capitalize on the low prices if steel companies enforce the rule rigidly.

Export inquiries continue brisk. Heavy steel products such as bars, plates and semi-finished predominate in foreign demand, followed by tin plate and wire. Inquiries also include black sheets for South America and Mexico, alloy steel for Japan and strip for Europe.

April orders at CHICAGO sales offices ranged from just about even with the previous month to 35 per cent ahead. In all cases where improvements were shown, considerable diversification of products and industries was reported. The price reduction on sheets and strip from April 11 on to the end of the month apparently was not responsible for any large increase in specifications, and many believe the weakness had the opposite effect and retarded new business somewhat. At one office, specifications during the month exceeded shipments by about 20 per cent. This week orders are being received at the rate of 40 to 50 per cent of capacity, this level not having changed appreciably throughout the month.

Sales of agricultural machinery are fairly good, but finished stocks must be further depleted before production will again be high. Tin mill operations continue good and most units are at near-capacity. Railroads are still expected to build a large number of cars this year, but they are off to a very slow start.

Announcement of withdrawal of the low prices on flat rolled products, effective May 1, resulted in a mild increase in orders in the NEW YORK and PHILADELPHIA areas in the past week. The placing of this business was very orderly and did not begin to approach the situation existing in 1939 when the low prices were withdrawn.

The announced return of price schedules to previous levels as of May 1 brought a moderate improvement in the flat steel demand in the Southern Ohio district during the past week. Because shipping instructions on "cheap" steel has been limited to the second quarter, the rush was not as heavy as might otherwise have occurred.

Army and Navy construction continues to furnish considerable volume to Pacific Coast fabricators, and much additional business of this type is in sight.

Export inquiries are in large volume, but orders are not being closed as quickly as heretofore, a condition that may be due to the uncertainty in the minds of foreign buyers as a result of the domestic steel price situation. April export business was not as large as that done in March.

Change in Published Prices To Be Shown in Next Issue

OWING to the fact that this issue of THE IRON AGE went to press on April 30 and the finished steel composite price bears that date, no change has been made in quotations on sheets and strip, which for the record should reflect the continuance of the recently reduced prices up to and including April 30. The advance of $4 a ton, wiping out the recent reduction, will be shown in the issue of May 2.

The prices announced by Carnegie-Illinois Steel Corp. for the remainder of second quarter and all of the third quarter on various products are as follows at Pittsburgh and Chicago:

Blooms, billets and slabs for rerolling, $34 a gross ton. Forging quality, $40.

Sheet bars, $34 a gross ton.

Hot rolled alloy steel bars, 2.70¢ a lb.

Hot rolled carbon steel bars, 2.15¢ a lb.

Standard structural shapes, 2.10¢ a lb.

Plates, 2.10¢ a lb.

Hot rolled strip, 2.10¢ a lb.

Hot rolled sheets, 2.10¢ a lb.

Cold rolled sheets, 3.05¢ a lb.

Galvanized sheets, 3.50¢ a lb.

Long terne sheets, 3.80¢ a lb.

Vitrenamel sheets, No. 10 gage, 2.75¢ a lb.; No. 20 gage, 3.30¢ a lb.

Editor.

PRICES

. . . Concessions of $4 a ton on flat rolled products rescinded

THE sudden and unexpected announcement of prices last Thursday (April 25) by Carnegie-Illinois Steel Corp., which as of May 1 restored the $4 cut in certain flat rolled products, and reaffirmed present prices on major steel products on sales for shipment from May 1 to Sept. 30 has definitely clarified the steel price situ-

ation. Customers were given a week to place business at the low price for delivery not later than June 30, and in order to enable the mills to make shipment by that time, specifications against all orders placed prior to May 1 must be in the hands of steel makers in time to complete shipments on schedule. Late last week galvanized sheets joined the other bargain priced flat rolled products and were restored to the former level as of May 1, but consumers will get the same type of protection as they did on other flat rolled items with shipments to be completed by June 30.

A water freight rate increase, effective May 1, will cause an increase of 5c. per 100 lb. in the price of all steel at Pacific Coast ports on orders placed after that date.

Nails and other jobber-handled items continue to suffer pricewise because the movement out of stocks is below expectations. Nails are at least $2 off on jobbers' sales.

At the start of this week, stretcher-leveled sheets out of CLEVELAND warehouses were down $12 a ton, but standard cold rolled sheets had not been affected. The price of the stretcher-leveled grade, which is cold finished panel stock, has been out of line for some time.

SEMI-FINISHED STEEL

. . . Specifications expected to expand following sheet price advance

SPECIFICATIONS at PITTSBURGH are expected to expand further, owing to bookings from non-integrated sheet makers who have also withdrawn the low flat rolled sheet and strip prices as of May 1. The $2 a ton concession granted on sheet bars for conversion into sheets and strip will, of course, be withdrawn and non-integrated makers are expected to take out semi-finished tonnages promptly. Meanwhile, orders at PITTSBURGH so far this month are no heavier than a month ago but figures covering the next few days will undoubtedly reflect an increase from a month ago.

At CLEVELAND April order volume showed a decline from the March level, principally due to the fact that non-integrated mills refrained from buying during the price war on sheets, apparently hoping for reductions on sheet bars.

PIG IRON

. . . Shipping difficulties hamper export movement

PRODUCERS look for improved demand in May, although shipments and new orders were little changed the past week in most areas. Export demand continues substantial and would be still heavier if shipping difficulties could be overcome. Lack of ship space is now a bottleneck which is adversely affecting pig iron as well as steel shipments abroad.

Withdrawal of low prices on flat-rolled steel products has lessened uncertainty prevailing in the pig iron market at NEW YORK, PHILADELPHIA and other points. In the Eastern districts orders and shipments in April showed increases over March. Shipments and new orders continue substantially unchanged from a week ago at PITTSBURGH. Consumer stocks are not large and a representative change in general business conditions should be immediately reflected in order books.

At CLEVELAND, where April shipments were just about equal to March volume, producers confidently expect improvement during May, since consumer inventories are at a lower stage than any time in months. Prices are firm in the absence of heavy ordering. April shipments of pig iron at CHICAGO were slightly less than in the previous month, while a small increase was shown in foundry coke. As the month closed, spot sales of iron were in greater volume than earlier in the period, suggesting that inventories are well depleted, and that additional buying will be seen in May. Export inquiries continue numerous, but little is being accepted.

The SOUTHERN OHIO pig iron market is unchanged. Some contracting during the past week was reported, but furnace interests indicate that this was largely a reordering of needed material. Shipments, however, continue to hold to the previous level and indicate that present commitments are being used as received. Except for the continued unseasonable slowness of stove foundries, the melt shows relatively no change. Renewed interest in pig iron is reported at ST. LOUIS, but shipments for April are about on the same level as in March. Buying at BUFFALO is confined to scattered carlots largely for mixture purposes. Large foundries still have sufficient iron on hand and on order to fill requirements through May. The New England pig iron melt is slightly smaller and under 60 per cent of rated capacity.

PLATES

. . . April orders better than those of March

PLATE tonnage at PITTSBURGH has been running ahead of a month ago, the impetus being gained from domestic construction and export demand

April orders at CLEVELAND showed a gain over March with the export field more prominent and all the principal domestic users represented in varying degrees. Spring construction projects were a major factor in the improvement. Ship work has been yielding good volume.

Plate sales in PHILADELPHIA continue to move sidewise. Canadian buying is very light at the moment. South American business looms proportionately more important since the elimination of the Scandinavian market.

Tide Water Associated Oil Co. of Bayonne, N. J., is having a 15,000-bbl. unit constructed for its refinery; the steel will be placed through E. B. Badger & Sons Co., Boston, engineers on this job.

MERCHANT BARS

. . . Sales are holding at recent levels

WITH export requirements figuring prominently, bar sales at PITTSBURGH are holding at recent levels and orders so far this month show a moderate increase from the volume booked a month ago. Some automobile tonnage has been placed recently and miscellaneous customers in many instances are expanding their requirements.

Farm implement and tractor sales are good, but the stocks of finished machinery must be reduced somewhat more before production schedules will be heavy again. Forgers and jobbers at Chicago are actively consuming bar steel, and the various plants supplying automobile parts from that district are well occupied. The motor car industry is also the chief customer for alloy bars there, though considerable export demand is also being reported.

CLEVELAND and YOUNGSTOWN sellers report hot rolled carbon bar demand continues to hold up well. April orders showed a gain over March. Prospects indicate a good flow of business during May. In addition to the well maintained domestic market export prices are firmer.

TUBULAR GOODS

. . . Volume of orders moderately ahead of month ago

TOTAL pipe specifications at PITTSBURGH are running moderately ahead of a month ago and specific improvement has been noted in the past week, especially in the volume of specifications for oil country goods. Standard merchant pipe is moving at a faster clip and there has been no abatement in the good volume of miscellaneous line pipe business. Line pipe prices continue irregular.

April order volume of CLEVELAND and YOUNGSTOWN producers showed a gain over March. Oil well casing and line pipe registered the best improvement. Standard pipe is seasonally more active but not up to expectations. Moderate export demand, principally from South America, materialized during the past month.

WIRE PRODUCTS

. . . Nails have weakened at least $2 a ton

WIRE nails at PITTSBURGH are weak to the extent of at least $2 a ton in the prices to jobbers, which reflects a condition prevalent throughout major centers in the country. Large jobber stocks and the failure of fresh business to develop as was expected owing to weather conditions, have been major factors in the present price softness. Total wire sales at PITTSBURGH so far this month are little if any ahead of a month ago. Merchant products, however, appear to be moving a little more briskly.

Aggregate commitments of CLEVELAND producers during April showed a gain of around 10 per cent over March volume, with manufacturers' wire a prominent factor in the gain. Price weaknesses in secondary merchant wire markets seem to center in Texas, Ky., and the Missouri River Valley and New York City. New England and the Middle West have not yet suffered to any great degree. Subnormal demand and excessive stocks in the hands of large jobbers are responsible for the weaknesses. Manufacturers' wire has not been affected.

April bookings at CHICAGO were slightly higher than the previous month, but a few more weeks of the prevalent spring weather is needed before volume will be substantially better. Automobile spring makers here are still hard at work on 1940 requirements, which are considerably larger than was expected for this time. Plans for 1941 cars are indefinite pending exact knowledge of the end of runs on current models. Merchant wire demand is improving week by week.

SHEETS AND STRIP

. . . Fairly heavy bookings follow withdrawal of low prices

SHEET bookings in the past week have risen substantially at PITTSBURGH, but the activity has by no means equalled the grand rush of last May. Customers were permitted to place orders and contracts at the $4 bargain prices up to and including April 30. As of May 1, the cuts were withdrawn and the former price level reestablished on sales for shipments up to and including Sept. 30. Mills are insisting that specifications against orders placed prior to May 1 shall be in their hands in sufficient time to enable prompt shipment by June 30.

So far miscellaneous flat rolled consumers and small tonnage customers have sent in their orders promptly but some large users are waiting until the last minute to send in their requirements.

Tonnages entered on the books for shipment before June 30 at the low prices are expected to be substantial, and sheet mill operations during May and June will be at a considerably higher rate.

Obviously fresh sheet and strip orders will be negligible in volume on and after May 1, for the simple reason that all consumers have been given the chance to cover for second quarter shipments.

The restoration of flat rolled steel prices, which came unexpectedly, will give no chance to the automotive industry to squeeze in any more than a very small portion of its 1941 model requirements.

Late last week galvanized sheets joined the parade of flat rolled products and up to April 30 were being sold at $4 off the published price, subject to shipment by June 30.

CHICAGO sheet and strip users, generally, were not excited over the rescinding of the $4 a ton concession on May 1. Most buyers, of course, have protected themselves with blanket orders, but still there is a singular lack of eagerness on their part to take advantage of the bargain prices by sending in specifications early so as to insure delivery by June 30. This is explained by sellers as being due to only fair activity, at various consuming plants. A large tonnage of sheets, even if low priced, would thus be an inconvenience because of storage necessities, and in some cases entirely out of the question. Even the automobile companies, it is believed at CHICAGO, will find it difficult to save money in this instance, because the June 30 deadline on shipments approximates the changeover period. Even if storage were feasible for the auto plants, the question of sizes may not be definitely settled by the end of June.

CHICAGO steel producers are steadfast in their determination to hold to the June 30 limit, knowing full well that a substantial lapover into July or a protection to certain parties only beyond the deadline could easily precipitate another period similar to that following May, 1939. Today, buyers seem disposed to wait until the last possible moment before sending in specifications. In case a rush develops later in the quarter, most mills are preparing quota schedule for customers. One producers has virtually filled the quarterly books with blanket orders, but specifications may not be given for all of this tonnage.

Coverage by consumers of sheets and strip in the CLEVELAND and YOUNGSTOWN districts was more moderate than in previous bargain periods of the last two years. Varied reasons advanced for this lighter forward buying include the fact that many users were slow in depleting their winter stocks. As in the past, no extra business has come out beyond what would have arisen in the normal course of events.

Mills at CLEVELAND and YOUNGSTOWN continue to emphasize the June 30 deadline on shipments. If all producers adopt the same stand, only a small portion of the auto industry will be able to take full advantage of the low price situation. Some auto makers will be unable to specify exact sizes in time to receive deliveries. Concessions on cold rolled strip and commodity cold rolled strip were withdrawn, effective May 1, along with hot rolled sheets and strip.

Bookings of sheets in SOUTHERN OHIO during the past week were increased to approximately 60 per cent of mill capacity.

Bookings of sheets and strip in the NEW YORK area were apparently not

as heavy as in some other districts The NEW YORK market was greatly excited late last week, however, by a break in prices of galvanized sheets, which apparently started in that market, although it spread to other districts. Not all mills offered a concession on galvanized sheets, but some of them gave their customers an opportunity to cover at $4 a ton off. This concession, like those on other flat rolled products, was withdrawn as of May 1.

RAILROAD BUYING

. . . Union Railway buys three diesel-electric engines

UNION RAILWAY has purchased three diesel-electric switchers from American Locomotive Co. and Rock Island has been authorized to buy one 1000-hp. diesel electric switcher from the same company.

Newfoundland Railway is considering the purchase of 50 flat cars and Milwaukee Road has received authority to effect a lease-purchase agreement with the General American Transportation Corp. covering 35 covered hopper cars. Norfolk & Southern has supplemented its previous purchase of 40 rack cars with 12 caboose cars, awarded to Magor Car Corp.

REINFORCING BARS

. . . 2650 tons for Shasta power plant is largest award

REINFORCING steel awards at 4150 tons are slightly lower than a week ago. The only sizable letting is 2650 tons for the Shasta power plant at Coram, Cal.

New reinforcing steel projects total 10,850 tons and include 2000 tons for the Long Island Railroad subway at Broklyn, 1250 tons for improvements in Mississippi River locks and dams, and 1000 tons for a dam at Kanapolis, Kan.

The price situation is no better than it was a week ago. Quotations to contractors are still subject to circumstances surrounding the individual jobs.

WAREHOUSE BUSINESS

. . . Sales in most districts about on par with March

APRIL sales at CHICAGO steel warehouses were about on a par with March. Of chief interest to the trade are sheets and strip, small bars, light structural sections and bar shapes. Since the middle of January, CHICAGO warehouses have experienced a sidewise movement, their only consolation being that this general level is above that of a year ago.

At CLEVELAND, warehouse order volume for April was comparable to the March total by virtue of accumulated small orders. Hot rolled sheet and strip prices are down $4 per ton, but up to the start of this week cold rolled strip and sheet prices were unchanged except the stretcher leveled grade of cold rolled, which is down 60c. per 100 lb. New cutting extras on bars went into effect early in April.

April business at DETROIT was about on a level with March business, although there has been an increase in buying requirements of tool and die shops. It is expected that this will continue to be an active type of business for the next two or three months. Prices on hot and rolled sheet and strip took a downward drop coincident with the lowering of mill prices during April. These lower prices are continued in effect, temporarily at least; there are indications that the lower prices will prevail until the end of the quarter.

Sales in PHILADELPHIA and NEW YORK in April were generally a little below the March level, with the heavy steels moving especially slow. The usual seasonal gain is expected in May. Hot rolled sheets and strip, cold rolled sheets and strip, enameling sheets and long ternes, which were reduced two weeks ago in keeping with the cut in mill prices, above not yet been restored to their former levels. Quotations on galvanized sheets in both districts remain unchanged at the time of going to press.

Warehouse business in St. Louis for April was spotty with good days and bad, but the final result was about on a par with March.

STRUCTURAL STEEL

. . . Awards and inquiries are in small volume

FABRICATED structural steel awards declined to 6700 tons from 13,000 tons last week. The only lettings of size are 1400 tons for caisson gates for Pearl Harbor and Puget Sound Navy yards, and 1100 tons for transmission towers at Franklin, Tenn., for the TVA.

New structural steel projects call for 10,500 tons, against 6700 tons a week ago, with the bulk in small lots. The largest inquiries include 1600 tons for a bridge at Kettle Falls, Wash., and 1300 tons for an air base hangar at Fairbanks, Alaska.

Guy F. Atkinson, San Francisco, was low bidder for construction of embankment and excavation at Denison, Tex., dam. The contract calls for about 4000 tons of sheet piling.

TIN PLATE

. . . Operations remain at 66% . . . Cold reduction mills busy

OPERATIONS are at 66 per cent, unchanged from a week ago but up three points from two weeks ago. Cold reduction mills are operating at close to capacity. Seasonal factors are responsible for an expansion in the volume of specifications and there has been a definite, although moderate, pick-up in export inquiry and bookings.

Weekly Bookings of Construction Steel

	Week Ended				Year to Date	
	Apr. 30, 1940	Apr. 23, 1940	Apr. 2, 1940	May 2, 1939	1940	1939
Fabricated structural steel awards	6,700	13,000	8,750	11,950	248,410	327,060
Fabricated plate awards	450	2,410	2,685	17,470	54,865	66,990
Steel sheet piling awards	1,770	2,000	1,400	0	15,865	18,165
Reinforcing bar awards	4,150	4,510	10,100	19,250	144,380	166,595
Total Letting of Construction Steel	13,070	21,920	22,935	48,670	463,520	578,810

Steel Exports Move Upward in March

FURTHER gains were recorded in the United States export trade in iron and steel products—scrap excepted—in March when shipments totaled 457,052 gross tons valued at $34,220,853, preliminary figures just released by the Metals and Minerals Division of the Bureau of Foreign and Domestic Commerce reveal. In February this trade had set a modern record of 436,585 tons valued at $33,361,201, while in March, 1939, only 162,098 tons of iron and steel valued at $12,569,693 had been exported.

First quarter iron and steel exports —1,289,701 tons valued at $98,735,419 —were virtually three times as great in tonnage and were more than three times as valuable as those of the January-March period of 1939—431,663 tons valued at $32,556,947.

Shipments to every continental area rose in March as compared with February. The trade with Europe climbed to 153,326 tons from 146,447 tons in the month preceding, South America took 125,874 tons against 119,639 tons, shipments to the Far East were reported at 89,337 tons against 83,260 tons, North and Central America and the West Indies took 73,870 tons against 72,662 tons with shipments to Africa higher by the narrow margin of 14,645 tons against 14,577 tons.

Each of the five leading markets—in point of tonnage purchased—took more iron and steel in March than in February—the United Kingdom, 78,828 tons against 68,130 tons; Argentina, 47,859 tons against 43,281 tons; Canada, 46,266 tons against 40,586 tons; Brazil, 35,563 tons against 30,547 tons, and Japan, 22,174 tons against 10,952 tons.

Down 12 per cent in quantity and 18 per cent in value, exports of scrap from the United States in March totaled only 206,928 gross tons valued at $3,387,037, according to preliminary figures. February shipments had amounted to 234,716 tons valued at $4,137,635 while those of March, 1939, had amounted to 312,262 tons valued at $4,640,598.

First quarter scrap exports—629,101 tons valued at $11,091,893—were 17.7 per cent smaller in quantity but only 2.2 per cent less in value than those of the January-March period of 1939—765,059 tons valued at $11,337,293.

Imports of Metal-Working Machinery Into Canada, March, 1940

Classification	United United	United Kingdom	Total All Countries
Drilling and boring machines	$80,955	$7,438	$88,393
Grinding machines	100,650	1,470	108,840
Lathes	105,699	1,459	109,144
Milling machines	41,947	15,774	57,721
Planers	1,665	.....	1,665
Presses	77,060	2,235	79,295
Rolling mill machines	23,453	12,916	36,369
Shapers and slotters	14,693	1,538	16,231
Not otherwise listed	470,376	11,718	482,694
Grand Totals	$916,498	$54,548	$979,752

Source: Dominion Bureau of Statistics.

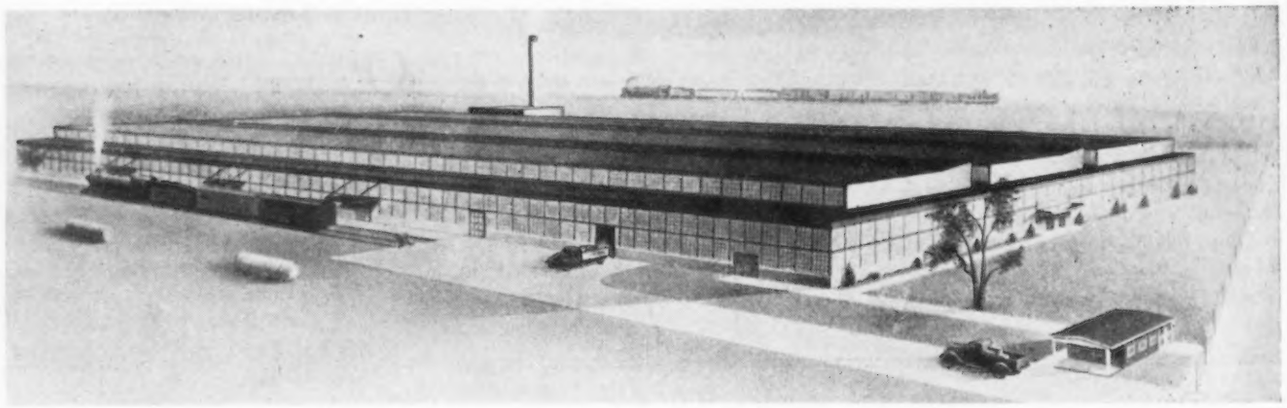
Household Equipment Output Up in 1939

HOUSEWIVES of the nation bought more than 400,000 net tons of steel last year through their purchases of kitchen ranges, refrigerators and washing machines, thereby creating the equivalent of full-time employment for nearly 10,000 men in the plants of the steel industry, according to the American Iron and Steel Institute.

In addition, their purchases provided still more jobs in the manufacture of the refrigerators, ranges, and washing machines themselves. During 1939, more than 5,217,000 refrigerators, ranges and washing machines were produced, a total of 35 per cent above 1938 production of 3,863,000 units but about 22 per cent below the 1937 peak of 6,691,000.

About 201,000 tons of steel were consumed in the gas and electric refrigerators produced last year, while an additional 159,000 tons of steel went into the kitchen ranges produced last year.

Approximately 41,000 tons of steel were used last year in the production of washing machines.



Another New Plant in Automobile District

A NEW plant for the manufacture of automotive radiators for original factory equipment on passenger cars, trucks, tractors, buses and gasoline or diesel-driven industrial units, as well as heaters for cars, trucks and buses, has been completed at Owosso, Mich., by the Fedders Mfg. Co., Buffalo. With the long-established Buffalo factory, it doubles Fedders' manufacturing capacity. "The adoption of hot water heaters for cars, trucks and buses has developed into an important branch of the equipment or accessory branch of the industry," says L. F. Fedders, president of the company.

. . . NON-FERROUS . . .

. . . Buying in light volume all week . . . Total lead stocks decline 4569 tons . . . Week's spelter sales are 1693 tons.

NEW YORK, April 30—The market in the past week was simply an extension of the dull conditions ruling in the preceding period. Prices generally were unchanged and buyers continued to display extreme caution toward entering into forward commitments. Daily copper sales averaged in the neighborhood of 2000 tons, with a split price still prevailing. Mine producers continue to quote 11.50c. per lb., Valley delivery, while smelting interests are doing business at 11.25c. per lb. Total sales reported for April were slightly in excess of 40,000 tons, or almost double the March figure. Export demand was in moderate volume all week, with quotations hovering around 11.25c. per lb., f.a.s. Forward positions in the export market were available today at 11.125c. per lb. Threat of possible liquidation of about 13,000 tons of copper previously purchased by Russia created considerable speculation as to the strength of present domestic price structure and added to buyers' caution. However, it is indicated that this metal will not be immediately put on the market. There is a further question as to what portion of this material is bonded and how much is eligible for sale in the domestic market. Some of this copper was purchased by the Russians at as high as 13.50c., and probably all of it was covered at prices above present prices.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Apr. 24	Apr. 25	Apr. 26	Apr. 27	Apr. 29	Apr. 30
*Copper, Electrolytic[1]	11.50	11.50	11.50	11.50	11.50	11.50
Copper, Lake	11.50	11.50	11.50	11.50	11.50	11.50
Tin, Straits, New York	47.375	47.45	47.50	...	47.625	47.25
Zinc, East St. Louis[2]	5.75	5.75	5.75	5.75	5.75	5.75
Lead, St. Louis[3]	4.95	4.95	4.95	4.95	4.95	4.95

* Mine producers' quotations only.

[1] Delivered Conn. Valley. Deduct ¼c. for New York delivery. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Prices

Cents per lb., Delivered

	New York	Cleveland
Tin, Straits, pig	48.25c.	50.50c.
Copper, Lake	13.25c.	12.625c.
Copper, electro	12.75c.	12.625c.
Copper, castings	12.375c.	12.375c.
*Copper sheets, hot-rolled	20.12c.	20.12c.
*Yellow brass sheets	18.31c.	18.31c.
*Seamless brass tubes	21.06c.	21.06c.
*Seamless copper tubes	20.62c.	20.62c.
*Yellow brass rods	14.26c.	14.26c.
Zinc slabs	7.10c.	7.75c.
Zinc sheets, No. 9 casks	12.00c.	13.35c.
Lead, American pig	6.10c.	5.50c.
Lead, bar	8.05c.	8.25c.
Lead, sheets, cut	8.25c.	8.25c.
Antimony, Asiatic	16.00c.	17.00c.
Alum., virgin, 99 per cent plus	20.50c.	21.50c.
Alum., No. 1 remelt., 98 to 99 per cent	18.00c.	18.50c.
Solder, ½ and ½	29.90c.	29.00c.
Babbitt metal, anti-friction grade	19.85c.	19.00c.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33⅓; on brass sheets and rods, 40; on brass tubes, 33⅓, and copper tubes, 40.

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	9.25c.	9.875c.
Copper, hvy. and wire	8.25c.	8.625c.
Copper, light and bottoms	7.25c.	7.75c.
Brass, heavy	5.00c.	5.50c.
Brass, light	4.125c.	4.875c.
Heavy machine composition	7.75c.	8.375c.
No. 1 yel. brass turnings	4.75c.	5.75c.
No. 1 red brass or compos. turnings	7.25c.	8.75c.
Lead, heavy	4.00c.	4.375c.
Cast aluminum	7.75c.	8.75c.
Sheet aluminum	13.00c.	14.00c.
Zinc	3.00c.	3.75c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 19c.-20c. a lb.; No. 12 remelt No. 2 standard, 18c.-19c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, $174 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 11.75c. a lb.

Zinc

Prime Western sales in the past week totaled 1693 tons, as against 1460 tons in the preceding week, and shipments were 3271 tons against 3903 in the previous period. The bulk of the buying centered in April-May positions. The low volume of current domestic sales has accentuated interest in the export market. Foreign demand in the past week, however, was not especially active. Prosecution of the war abroad has acted to dry up supplies heretofore exported by Belgium, France and England, causing importing nations to turn here for supplies. Domestic prices are unchanged at 5.75c. per lb., East St. Louis.

Lead

A moderately active demand for May metal created some activity in the market in the past week, but the market generally suffered from the extreme caution being exercised by all non-ferrous metal buyers. Covering of May needs accounted for the bulk of the week's sales, very little interest being shown in June positions. May at present is about 75 to 80 per cent bought. Quotations were unchanged all week at 4.95c. per lb., St. Louis. Total stocks of lead on April 1 stood at 154,901 tons, as compared with 159,470 tons on March 1.

Tin

A fair consumer demand for tin kept prices fairly steady all the past week. The highest price of the period was 47.625c. on Friday and the low 47.25c. today. While supplies arriving from abroad are roughly equal to the apparent current rate of consumption, nearby metal is still fairly tight. Additional strength to the present price structure is expected to materialize from Treasury Department's action in seeking bids on one to 500 tons of tin for delivery over six months. Cash standards in London today are quoted at £253 5s., or 5s. below price of a week ago.

NLRB Opens Pay Claim Offices for Steel Strikers

WASHINGTON — The National Labor Relations Board on Monday opened offices in the Ohio steel towns of Youngstown, Canton, Massillon and Niles in order to ascertain the claims for back pay and reinstatement of an estimated 9000 workers. This step was taken under the order of the Circuit Court of Appeals enforcing the board's order against Republic Steel Corp. in connection with the 1937 strike.

IRON AND STEEL SCRAP

APRIL 30—The strength observed at Youngstown and Cleveland last week has reached Pittsburgh and No. 1 steel is 50c. higher this week. The "short" situation there and rising ingot operations are adding elements of strength. At Chicago brokers are already paying 25c. to 50c. over the sale price to cover mill orders made last week at a 25c. advance over the previous sale. No. 1 steel is up 25c. on the average there. The primary grade is unchanged in price at Philadelphia, where a substantial sale of No. 2 confirmed previous quotations. Few changes are reported elsewhere. Though local buying is absent in Detroit, dealers are in a bullish frame of mind and have advanced buying prices 50c. on the average. Canadian interests are inquiring for material at Detroit and this situation has added an element of strength. Canada is also sounding out the Buffalo market for cast grades.

As a result of the changes indicated, the composite price has advanced 25c. this week to $16.38, making the third successive week of the current advance. Rising ingot operations this week substantiate the bullish sentiment in the scrap trade that has been gathering momentum in recent weeks. The average of the composite price for the five weeks of April is $16.14, as compared with $16.56 for March, computed on a four week basis.

Pittsburgh

The market is definitely stronger than a week ago and with some brokers paying $16.50 and more for No. 1 steel and with this grade having sold into consumption during the past week at $17 a ton, No. 1 steel is quoted this week at $16.50 to $17, up 50c. a ton from a week ago. Brokers and dealers who are short are hastening to cover owing to the apparent scarcity of scrap, stronger markets elsewhere, and the possibility of an increase in ingot operating rates in the near future. Low phos. scrap grades continue strong and the entire scrap market has taken on an expectant tone.

Chicago

Heavy melting steel sold last week at two district mills for $15.50 but since brokers are paying from $15.75 to $16 to cover these orders, this item is quoted this week at $15.50 to $15.75. The trade here is highly confused because the necessity of covering orders at from 25c. to 75c. a ton over the sale price extends throughout much of the Chicago list. The Rock Island sold some No. 1 steel last week around $16.85 a gross ton, delivered Chicago district. Mill operations are slightly higher this week than last but there is no certainty that this trend will continue over the next few weeks.

Philadelphia

A district mill last week purchased a substantial tonnage of No. 2 melting steel at $15.50. This purchase, the first important one in recent weeks, substantiates existing quotations. Blast furnace material is firm at $9, although business has been done slightly below this figure under favorable local conditions. Withdrawal of concessions on flat rolled products, coinciding with an increase in the national rate of ingot output, has given rise to an atmosphere of optimism here, particularly among brokers. District mills, however, do not all share this feeling.

Youngstown

Scrap is none too readily obtainable here. No. 1 heavy melting steel at $16.50 to $17 per ton is unchanged this week, but there are indications that additional strength will come to light with the next sale into mill consumption. Railroad lists closing this week are expected to be higher than at any time in several months.

Cleveland

The market here holds a strong undertone despite the fact opening of navigation on the Great Lakes has eased the supply situation a little. Dealers buying prices lend a bullish flair to the situation. Quotations this week are unchanged in the absence of fresh mill purchasing and all eyes are centered upon the monthly railroad lists closing this week.

Buffalo

For the week past the market has remained on the dull side, no significant sales having been reported, and with one mill continuing to suspend shipments. Cast scrap remains strong and not too plentiful. The underlying tone of the market is no weaker and sentiment is good. Scrap is beginning to move in by water, about 10,000 tons of material having come in in two recent shipments.

St. Louis

Scrap iron prices in the St. Louis market are unchanged. No new sales are reported, and no deals are pending, brokers say. Market is steady. Railroad lists: Baltimore & Ohio, 4800 tons; Alton, 888 tons.

Cincinnati

Reports of improvement in the Chicago and Detroit area strengthened the district old materials market during the past week, although there was no tangible basis for more optimistic sentiment. Dealers, however, did some trading in anticipation of better mill demand, but consumers show relatively no interest in further coverage. Dealers generally feel that an increase in bids is imminent, but are inclined to wait the trend before making definite announcement.

Birmingham

Betterment in weather conditions is expected to bring into local yards some scrap stock during the few remaining days of April, which will afford opportunity for sales. At this time yards have not been able to buy any appreciable amount of scrap, although dealers are willing to buy for future sales. Opinion is general that the present price will hold until May is three or four days old, when the larger buyers indicate their plans for the month. Meanwhile, nearby ports have made some foreign shipments lately but it is such a catch-as-catch-can game that the reactions here have not resulted in fluctuations of the price, now in its fourth week at $14.50 for No. 1 and $1 less for No. 2.

Detroit

Despite absence of local mill buying and the completion of most old orders for consumption locally, speculative buying has inched prices upward. Lists closing after the first of the month promise to be indicative of even stronger speculative sentiment than has already been exhibited. Anticipation of one important buy of open hearth material is a factor, as is the steady flow of Canadian inquiries for every type of scrap. Buying from outside markets has also been a factor. Much scrap in the last few weeks has moved to the water's edge for possible shipments down the Lakes or to Canada.

New York

Extreme quietness continues to prevail in the export market and little buying activity is going on in connection with future and uncertain shipments. Prices of material delivered to barges are unchanged, as are prices of scrap on cars for delivery to eastern Pennsylvania. Brokers are a little more bullish concerning the domestic situation.

Boston

Business for domestic account is practically at a standstill. General opinion among brokers is that things should pick up if steel mill operations continue to increase. The American Steel & Wire Co., Worcester, Mass., is reported to have purchased a tonnage of No. 1 steel from a western Massachusetts dealer, but details are lacking. Foundry interest in textile and machinery cast seems to have evaporated. As for the waterway market, a steamer is loading here for England, and barges at Providence, R.I., on old orders, presumably for eastern Pennsylvania delivery.

Toronto

Iron and steel scrap prices generally held firm in the Canadian markets during the week and, while no changes were made in lists, some dealers continued to pay above market for some lines of steel. Demand from mills, electric furnace operators and other users of steel scrap is strong, with consumers interested both for immediate and future needs. Foundries also are more active buyers and dealers state there is a ready market for all the cast scrap and stove plate they have to offer. Some melters report difficulty in obtaining sufficient cast to meet demands and as a result some have turned to Buffalo and Detroit in hope of obtaining cast, especially No. 1 cast, which is scarce and at a premium here.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$16.50 to $17.00
Railroad heavy melting	17.00 to 17.50
No. 2 heavy melting	15.00 to 15.50
Railroad scrap rails	17.50 to 18.00
Rails 3 ft. and under	21.00 to 21.50
Comp. sheet steel	16.50 to 17.00
Hand bundled sheets	15.50 to 16.00
Heavy steel axle turn.	14.50 to 15.00
Machine shop turnings	10.50 to 11.00
Short. shov. turnings	11.50 to 12.00
Mixed bor. & turn.	8.75 to 9.25
Cast iron borings	8.75 to 9.25
Cast iron carwheels	19.00 to 19.50
Heavy breakable cast.	15.00 to 15.50
No. 1 cupola cast	17.50 to 18.00
RR. knuckles & coup.	21.00 to 21.50
Rail coil springs	21.50 to 22.00
Rail leaf springs	21.50 to 22.00
Rolled steel wheels	21.50 to 22.00
Low phos. billet crops	22.00 to 22.50
Low phos. punchings	21.00 to 21.50
Low phos. heavy plate	20.00 to 20.50
Railroad malleable	22.00 to 22.50

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$16.50 to $17.00
No. 2 hvy. mltng. steel	15.50
Hydraulic bund., new	16.50 to 17.00
Hydraulic bund., old	14.00 to 14.50
Steel rails for rolling	20.50 to 21.00
Cast iron carwheels	20.00 to 20.50
Hvy. breakable cast	18.50
No. 1 cupola cast	20.00 to 20.50
Mixed yard (f'd'y) cast	16.50
Stove plate (steel wks.)	15.00 to 15.50
Railroad malleable	21.00 to 22.00
Machine shop turn.	9.50
No. 1 blast furnace	9.00
Cast borings	10.50 to 11.00
Heavy axle turnings	14.00 to 14.50
No. 1 low phos. hvy.	21.00 to 21.50
Couplers & knuckles	21.00 to 21.50
Rolled steel wheels	21.00 to 21.50
Steel axles	21.50 to 22.00
Shafting	22.00 to 22.50
Spec. iron & steel pipe	16.00 to 16.50
Cast borings (chem.)	14.00 to 14.50

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy. mltng. steel	$15.50 to $15.75
Auto. hvy. mltng. steel alloy free	14.50 to 14.75
No. 2 auto steel	12.25 to 12.75
Shoveling steel	15.50 to 15.75
Factory bundles	15.00 to 15.25
Dealers' bundles	13.50 to 13.75
No. 1 busheling	14.50 to 14.75
No. 2 busheling, old	7.00 to 7.50
Rolled carwheels	17.50 to 18.00
Railroad tires, cut	18.00 to 18.50
Railroad leaf springs	17.25 to 17.75
Steel coup. & knuckles	17.50 to 18.00
Axle turnings	14.50 to 14.75
Coil springs	18.75 to 19.25
Axle turn. (elec.)	16.00 to 16.50
Low phos. punchings	18.00 to 18.50
Low phos. plates 12 in. and under	17.50 to 18.00
Cast iron borings	9.50 to 10.00
Short shov. turn.	9.50 to 10.00
Machine shop turn.	9.25 to 9.75
Rerolling rails	18.00 to 18.50
Steel rails under 3 ft.	17.75 to 18.25
Steel rails under 2 ft.	19.00 to 19.50
Angle bars steel	18.50 to 19.00
Cast iron carwheels	17.50 to 18.00
Railroad malleable	19.25 to 19.75
Agric. malleable	13.75 to 14.25
	Per Net Ton
Iron car axles	21.00 to 21.50
Steel car axles	20.50 to 21.00
Locomotive tires	14.00 to 14.50
Pipes and flues	10.50 to 11.00
No. 1 machinery cast	15.50 to 16.00
Clean auto. blocks	16.00 to 16.50
No. 1 railroad cast	14.00 to 14.50
No. 1 agric. cast	12.50 to 13.00
Stove plate	10.00 to 10.50
Grate bars	9.50 to 10.00
Brake shoes	10.25 to 10.75

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$16.50 to $17.00
No. 2 hvy. mltng. steel	15.50 to 16.00
Low phos. plate	19.00 to 19.50
No. 1 busheling	15.75 to 16.25
Hydraulic bundles	16.00 to 16.50
Machine shop turn.	10.00 to 10.50

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$16.00 to $16.50
No. 2 hvy. mltng. steel	15.00 to 15.50
Comp. sheet steel	15.50 to 16.00
Light bund. stampings	13.50 to 14.00
Drop forge flashings	15.00 to 15.50
Machine shop turn.	8.50 to 9.00
Short shov. turn.	9.50 to 10.00
No. 1 busheling	15.50 to 16.00
Steel axle turnings	14.50 to 15.00
Low phos. billet and bloom crops	20.50 to 21.00
Cast iron borings	9.50 to 10.00
Mixed bor. & turn.	9.50 to 10.00
No. 2 busheling	9.50 to 10.00
No. 1 cupola cast	19.00 to 19.50
Railroad grate bars	13.50 to 14.00
Stove plate	13.50 to 14.00
Rails under 3 ft.	20.00 to 20.50
Rails for rolling	19.50 to 20.00
Railroad malleable	19.00 to 19.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$16.00 to $16.50
No. 2 hvy. mltng. steel	14.50 to 15.00
Scrap rails	18.50 to 19.00
New hvy. b'ndled sheets	14.50 to 15.00
Old hydraul. bundles	12.50 to 13.00
Drop forge flashings	14.50 to 15.00
No. 1 busheling	14.50 to 15.00
Machine shop turn.	10.50 to 11.00
Shov. turnings	11.50 to 12.00
Mixed bor. & turn.	10.00 to 10.50
Cast iron borings	10.00 to 10.50
Knuckles & couplers	19.50 to 20.50
Coil & leaf springs	19.50 to 20.50
Rolled steel wheels	19.50 to 20.50
No. 1 machinery cast	18.50 to 19.00
No. 1 cupola cast	17.50 to 18.00
Stove plate	14.50 to 15.00
Steel rails under 3 ft.	21.50 to 22.00
Cast iron carwheels	17.50 to 18.00
Railroad malleable	19.00 to 19.50

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting	$14.00 to $14.50
No. 1 hvy. melting	13.50 to 14.00
No. 2 hvy. melting	12.25 to 12.75
No. 1 locomotive tires	14.75 to 15.25
Misc. stand. sec. rails	15.00 to 15.50
Railroad springs	16.25 to 16.75
Bundled sheets	9.00 to 9.50
No. 1 busheling	13.00 to 13.50
Cast bor. & turn.	5.00 to 5.50
Machine shop turn.	6.50 to 7.00
Heavy turnings	9.25 to 9.75
Rails for rolling	17.50 to 18.00
Steel car axles	18.50 to 19.00
No. 1 RR wrought	10.00 to 10.50
No. 2 RR wrought	12.50 to 13.00
Steel rails under 3 ft.	18.00 to 18.50
Steel angle bars	14.75 to 15.25
Cast iron carwheels	15.50 to 16.00
No. 1 machinery cast	14.75 to 15.25
Railroad malleable	16.00 to 16.50
Breakable cast	14.00 to 14.50
Stove plate	10.50 to 11.00
Grate bars	9.50 to 10.00
Brake shoes	10.00 to 10.50

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel	$12.25 to $12.75
No. 2 hvy. mltng. steel	10.25 to 10.75
Scrap rails for mltng.	16.75 to 17.25
Loose sheet clippings	7.75 to 8.25
Hydrau. b'ndled sheets	11.75 to 12.25
Cast iron borings	3.50 to 4.00
Machine shop turn.	4.75 to 5.00
No. 1 busheling	8.75 to 9.25
No. 2 busheling	2.75 to 3.00
Rails for rolling	18.25 to 18.75
No. 1 locomotive tires	13.75 to 14.25
Short rails	18.75 to 19.25
Cast iron carwheels	14.25 to 14.75
No. 1 machinery cast	15.75 to 16.25
No. 1 railroad cast	13.75 to 14.25
Burnt cast	7.50 to 8.00
Stove plate	7.50 to 8.00
Agricul. malleable	12.25 to 12.75
Railroad malleable	15.25 to 15.75
Mixed hvy. cast	13.25 to 13.75

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting steel	$14.50
No. 2 hvy. melting steel	13.50
No. 1 busheling	14.00
Scrap steel rails	15.00
Steel rails under 3 ft.	16.00
Rails for rolling	16.50
Long turnings	5.00
Cast iron borings	7.50
Stove plate	10.00
Steel axles	18.00
No. 1 RR wrought	14.00
No. 1 cast	$16.00
No. 2 cast	12.50
Cast iron carwheels	13.00
Steel car wheels	16.00

DETROIT

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 hvy. mltng. industrial steel	$13.00 to $13.50
No. 2 hvy. mltng. steel	12.00 to 12.50
Borings and turnings	7.25 to 7.75
Long turnings	7.75 to 8.25
Short shov. turnings	8.75 to 9.25
No. 1 machinery cast	16.50 to 17.00
Automotive cast	16.25 to 16.75
Hvy. breakable cast	14.00 to 14.50
Stove plate	9.75 to 10.25
Hydraul. comp. sheets	14.50 to 15.00
New factory bushel	12.50 to 13.00
Sheet clippings	9.25 to 10.25
Flashings	12.50 to 13.00
Low phos. plate scrap	14.25 to 14.75

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel	$12.50 to $13.00
No. 2 hvy. mltng. steel	10.50 to 11.00
Hvy. breakable cast	14.00 to 14.50
No. 1 machinery cast	16.00 to 16.50
No. 2 cast	12.50 to 13.00
Stove plate	10.50 to 11.00
Steel car axles	19.00 to 20.00
Shafting	19.00 to 20.00
No. 1 RR. wrought	14.00 to 15.00
No. 1 wrought long	12.50 to 13.00
Spec. iron & steel pipe	13.50 to 14.00
Rails for rolling	15.50 to 16.00
Clean steel turnings*	5.00
Cast borings*	5.00 to 5.50
No. 1 blast furnace	5.00 to 5.50
Cast borings (chem.)	Nominal
Unprepared yard scrap	6.50 to 7.00
Light iron	4.50 to 5.00
Per gross ton delivered local foundries:	
No. 1 machin. cast	$17.00 to $18.50
No. 2 cast	16.50 to 17.00

* $1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton:

Breakable cast	$13.00 to $13.25
Machine shop turn.	4.15
Mixed bor. & turn.	3.15
Bun. skeleton long	8.80
Shafting	17.00 to 17.25
Stove plate	9.75 to 10.00
Cast bor. chemical	8.00 to 8.50
Per gross ton delivered consumers' yards:	
Textile cast	$15.50 to $17.00
No. 1 machine cast	15.50 to 17.00
Per gross ton delivered dealers' yards:	
No. 1 hvy. mltng. steel	$13.25
No. 2 steel	12.25

PACIFIC COAST

Per net ton delivered to consumer:

	San Fran.	Los Ang.	Seattle
No. 1 hvy. mltng. steel	$12.00	$12.00	$11.00
No. 2 hvy. mltng. steel	11.00	11.00	10.00
Bundles	10.00	10.00	9.00

CANADA

Dealers' buying prices at these yards, per gross ton:

	Toronto	Montreal
Low phos. steel	$11.50	$11.00
No. 1 hvy. mltng. steel	11.00	10.50
No. 2 hvy. mltng. steel	9.75	9.25
Mixed dealers steel	8.75	8.25
Drop forge flashings	9.75	9.25
New loose clippings	8.75	8.25
Busheling	6.00	5.50
Scrap pipe	7.75	7.25
Steel turnings	7.25	6.75
Cast borings	6.75	6.25
Machinery cast	20.00	19.00
Dealers' cast	19.00	18.00
Stove plate	14.00	13.00

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges	
No. 1 hvy. mltng. steel	$13.50
No. 2 hvy. mltng. steel	$11.50 to 12.00
No. 2 cast	12.00 to 12.50
Stove plate	10.00 to 10.50
Boston on cars at Army Base or Mystic Wharf	
No. 1 hvy. mltng. steel	$15.00
No. 2 hvy. mltng. steel	14.00
Rail (scrap)	15.00
Stove plate	$8.00 to 8.25
Philadelphia, delivered alongside boats, Port Richmond	
No. 1 hvy. mltng. steel	$16.00
No. 2 hvy. mltng. steel	14.75

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are effected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher F.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago or Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.45c.
Galveston	2.25c.

9/32 in. to 47/64 in. $3 a net ton higher. Quantity extras apply.

SOFT STEEL BARS

	Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham	2.15c.
Detroit, delivered	2.25c.
Duluth	2.25c.
Philadelphia, delivered	2.47c.
New York	2.49c.
On cars dock Gulf ports	2.50c.
On cars dock Pacific ports	2.75c.

RAIL STEEL BARS

(For merchant trade)

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.05c.
On cars dock Tex. Gulf ports	2.40c.
On cars dock Pacific ports	2.65c.

IRON BARS

Chicago (common)	2.25c.
Pittsburgh (refined)	3.75c.
Pittsburgh (wrought iron)	4.40c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt.	1.70c. to 1.90c.*
Detroit, delivered	1.80c. to 2.00c.*
On cars dock Tex. Gulf ports	2.20c. to 2.25c.*
On cars dock Pacific ports	2.20c. to 2.25c.*

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham.	1.70c. to 1.90c.*
Detroit, delivered	1.80c. to 2.00c.*
On cars dock Tex. Gulf ports	2.20c. to 2.25c.*
On cars dock Pacific ports	2.20c. to 2.25c.*

* The so-called published price on new billet reinforcing bars is 2.15c. a lb. f.o.b. major basing points and on rail reinforcing bars is 2.00c. a lb. The price range shown above, however, represents the going prices at the present time.

COLD FINISHED BARS AND SHAFTING*

Pittsburgh, Buffalo, Cleveland, Chicago, and Gary	2.65c.
Detroit	2.70c.

* In quantities of 20,000 to 39,999 lb.

PLATES

	Base per Lb.
Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont, Del.	2.10c.
Philadelphia, del'd	2.15c.
New York, del'd	2.29c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.60c.
Wrought iron plates, P'tg	3.80c.

FLOOR PLATES

Pittsburgh or Chicago.	3.35c.
New York, del'd	3.71c.
On cars dock Gulf ports	3.70c.
On cars dock Pacific ports	3.95c.

STRUCTURAL SHAPES

	Base per Lb.
Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham..	2.10c.
Philadelphia, del'd	2.215c.
New York, del'd	2.27c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.70c.

STEEL SHEET PILING

	Base per Lb.
Pittsburgh, Chicago or Buffalo	2.40c.
On cars dock Gulf ports	2.85c.
On cars dock Pacific ports	2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$40.00
Angle bars, per 100 lb.	2.70

F.o.b. Basing Points

Light rails (from billets) per gross ton	$40.00
Light rails (from rail steel) per gross ton	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast ports	2.25c.
Track bolts, to steam railroads	4.15c.
Track bolts to jobbers, all sizes (per 100 counts)	65-5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneapus, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

Hot Rolled

	Base per Lb.
Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago	1.90c.*
Detroit, delivered	2.00c.*
Philadelphia, delivered.	2.07c.*
Granite City	2.00c.*
On cars dock Pacific ports	2.40c.*
Wrought iron sheets, Pittsburgh	4.75c.

*On May 1, these prices were advanced 0.20c. per lb.

Cold Rolled*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago	2.85c.
Detroit, delivered	2.95c.
Granite City	2.35c.
Philadelphia, delivered.	3.17c.
On cars dock Pacific ports	3.45c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. On May 1, these prices were advanced 0.20c. per lb.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham	3.50c.
Philadelphia, del'd	3.67c.
Granite City	3.60c.
On cars dock Pacific ports	4.00c.
Wrought iron sheets, Pittsburgh	7.00c.

Electrical Sheets

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

Long Ternes

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary	3.60c.
F.o.b. cars dock Pacific ports	4.30c.

Vitreous Enameling Stock, 20 Gage*

Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland	3.15c.
Detroit, del'd	3.25c.
Granite City	3.25c.
On cars dock Pacific ports	3.75c.

TIN MILL PRODUCTS

Tin Plate

	Per Base Box
Standard cokes, Pittsburgh, Chicago and Gary (100 lb.)	$5.00
Standard cokes, Granite City (100 lb.)	5.10

Special Coated Manufacturing Ternes

	Per Base Box
Granite City	$4.40
Pittsburgh or Gary	4.30

Roofing Terne Plate

(F.o.b. Pittsburgh per Package, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

Black Plate, 29 gage and lighter*

Pittsburgh, Chicago and Gary	3.05c.
Granite City	3.15c.
On cars dock Pacific ports, boxed	4.00c.

*Black plate base price applies to 29 gage within certain width and length limitations.

HOT ROLLED STRIP

(Widths up to 12 in.)

	Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham	1.90c.
Detroit, delivered	2.00c.
On cars dock Pacific ports	2.50c.

On May 1, these prices were advanced 0.20c. per lb.

Cooperage Stock

Pittsburgh and Chicago	2.20c.

COLD ROLLED STRIP*

	Base per Lb.
Pittsburgh, Youngstown or Cleveland	2.60c.
Chicago	2.70c.
Detroit, delivered	2.70c.
Worcester	2.80c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

Pittsburgh, Youngstown, or Cleveland	2.75c.
Detroit, del'd	2.85c.
Worcester	3.15c.

COLD ROLLED SPRING STEEL

	Pittsburgh and Cleveland	Worcester
Carbon 0.26-0.50%	2.60c.*	2.80c.*
Carbon 0.51-0.75	4.30c.*	4.50c.*
Carbon 0.76-1.00	6.15c.*	6.35c.*
Carbon 1.01-1.25	8.35c.*	8.55c.*

* On May 1, these prices were advanced 0.20c. per lb.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

	To Manufacturing Trade Per Lb.
Bright wire	2.60c.
Galvanized wire, base	2.60c.
Spring wire	3.20c.

	To the Trade Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85

	Base per 100 Lb.
Annealed fence wire	$3.05
Woven wire fence, 15½ gage and heavier base col.	67
Fence posts (carloads), base col.	69
Single loop bale ties, base col.	56
Galvanized barbed wire on 80-rod spools (carloads) base col.	70
Twisted barbless wire, base col.	70

Note: Birmingham base same on above items, except spring wire.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld
Steel

In.	Black	Galv.
⅛	56	36
¼ to ⅜	59	43½
½	....63½	54
¾	....66½	58
1 to 3	....68½	60½

Wrought Iron

In.	Black	Galv.
⅛ & ¼	....+9	+30
⅜	24	6½
½	30	13
¾	34	19
1 & 1¼	38	21½
1½	....37½	21
2		

Lap Weld

2	61	52½
2½ & 3	64	55½
3½ to 6	66	57½
7 & 8	65	55½
9 & 10	....64½	55
11 & 12	....63½	54
2	....30½	15
2½ to 3½	....31½	17½
4	....33½	21
4½ to 8	....32½	20
9 to 12	....28½	15

Butt weld, extra strong, plain ends

⅛	....54½	41½
¼ to ⅜	....56½	45½
½	....61½	53½
¾	....65½	57½
1 to 3	67	60
¼ & ⅜	....+10	+43
½	25	9
¾	31	15
1 to 2	38	22½

Lap weld, extra strong, plain ends

2	59	51½
2½ & 3	63	55½
3½ to 6	....66½	59
7 & 8	....65½	56
9 & 10	....64½	55
11 & 12	....63½	54
2	....33½	18½
2½ to 4	....39½	25½
4½ to 6	....37½	24
7 & 8	....38½	24½
9 to 12	32	20½

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

Boiler Tubes

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes.

Minimum Wall.

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld Hot Rolled
1 in. o.d.13 B.W.G.	$9.01	$7.82	....
1¼ in. o.d.13 B.W.G.	10.67	9.26	....
1½ in. o.d.13 B.W.G.	11.70	10.23	$9.72
1¾ in. o.d.13 B.W.G.	13.42	11.64	11.06
2 in. o.d.13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d.13 B.W.G.	16.76	14.54	13.79
2¼ in. o.d.12 B.W.G.	18.45	16.01	15.16
2½ in. o.d.12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d.12 B.W.G.	21.42	18.59	17.54
3 in. o.d.12 B.W.G.	22.48	19.50	18.35
3½ in. o.d.11 B.W.G.	28.37	24.62	23.15
4 in. o.d.10 B.W.G.	35.20	30.54	28.66
4½ in. o.d.10 B.W.G.	43.04	37.35	35.22
5 in. o.d. 9 B.W.G.	54.01	46.87	44.25
6 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
*6-in. and larger, Birmingham	46.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00
4-in. f.o.b. dock, San Francisco, Los Angeles or Seattle	59.00

Class "A" and gas pipe, $3 extra

4-in. pipe is $3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $45. Birmingham, and $53.80 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts: ½ in. and 6 in. and smaller	68½
Larger and longer up to 1 in.	66
1⅛ in. and larger	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3, and 7	68½
Hot pressed nuts, and c.p.c. and t-nuts, square or hex. blank or tapped: ½ in. and smaller	67
9/16 in. to 1 in. inclusive	64
1⅛ in. to 1½ in. incl.	62
1⅝ in. and larger	60

On the above items with the exception of plow bolts, there is an additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
½ in. and smaller	67	70
9/16 to 1 in.	64	65
1⅛ in. through 1½ in.	62	62
1⅝ in. and larger	60	60

In full container lots, 10 per cent additional discount.

Stove bolts in packages, with nuts loose	72½
Stove bolts in packages, with nuts attached, add 15% extra.	
Stove bolts in bulk	$3½

On stove bolts freight is allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh, Cleveland Chicago, Birmingham $3.40

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham ....65 and 10

Cap and Set Screws

(Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.)

Per Cent Off List

Milled hexagon head, cap screws, 1 in. dia. and smaller	50 and 10
Milled headless set screws, cut thread ¼ in. and larger	64
3/16 in. and smaller	73
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	70
Upset set screws, cup and oval points	75
Milled studs	52

Alloy Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.

Base price, $56.00 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base 2.70c. Delivered, Detroit ..... 2.80c.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
200 (1½% Ni)	$0.35
2100 (1½% Ni)	0.75
2300 (3½% Ni)	1.55
2500 (5% Ni)	2.25
31 Ni-Cr	0.70
3200 Ni-Cr	1.85
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
4340 Cr-Ni-Mo	1.65
4345 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.20 to 0.30 Mo 1.50 to 2.00 Ni)	1.10
5100 (0.60-0.90 Cr)	0.35
5100 (0.80-1.10 Cr.)	0.45
6100 Cr spring steel	0.15
6100 Cr-V bar	1.20
6100 Cr-V spring steel	0.85
Cr-Ni-V	1.50
C-V	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. base per lb. Delivered Detroit, 3.45c., carlots.

STAINLESS & HEAT RESISTANT ALLOYS

(Base prices, cents per lb. f.o.b. Pittsburgh)

Chrome-Nickel

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.50c.
Cold-rolled strip	30c.	28c.
Drawn wire	25c.	24c.

Straight Chrome

No. 410	No. 430	No. 442	No. 446
Bars			
18.50c.	19c.	22.50c.	27.50c.
Plates			
21.50c.	22c.	25.50c.	30.50c.
Sheets			
26.50c.	29c.	32.50c.	36.50c.
Hot strip			
17c.	17.50c.	24c.	35c.
Cold strip			
22c.	22.50c.	32c.	52c.

TOOL STEEL

High speed	67c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

PIG IRON AND FERROALLOYS

No. 2 Foundry

F.o.b. Everett, Mass.	$24.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	24.00
Delivered Brooklyn	26.50
Delivered Newark or Jersey City	25.53
Delivered Philadelphia	24.84
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	23.00
F.o.b. Buffalo	23.00
F.o.b. Detroit	23.00
Southern, del'd, Cincinnati	23.06
Northern, del'd, Cincinnati	23.44
F.o.b. Duluth	23.50
F.o.b. Provo, Utah	21.00
Delivered, San Francisco, Los Angeles or Seattle	26.50
F.o.b. Birmingham*	19.38

* Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	$23.50
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	23.50
F.o.b. Buffalo	22.00
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	22.50
Delivered Philadelphia	24.34
Delivered Canton, Ohio	23.89
Delivered Mansfield, Ohio	24.44
F.o.b. Birmingham	18.00

Bessemer

F.o.b. Buffalo	$24.00
F.o.b. Everett, Mass.	25.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	25.00
Delivered Newark or Jersey City	26.53
Erie, Pa., and Duluth	24.00
F.o.b. Neville Island, Toledo, Chicago and Youngstown	23.50
F.o.b. Birmingham	24.00
Delivered Cincinnati	24.11
Delivered Canton, Ohio	24.89
Delivered Mansfield, Ohio	25.44

Low Phosphorus

Basing points; Birdsboro, Pa., Steelton, Pa., and Buffalo	$28.50

Gray Forge

Valley or Pittsburgh furnace	$22.50

Charcoal

Lake Superior furnace	$27.00
Delivered Chicago	30.34

Canadian Pig Iron

Per Gross Ton

Montreal	
Foundry iron	$27.50 base
Malleable	28.00 base
Basic	27.50 base
Toronto	
Foundry iron	$25.50 base
Malleable	26.00 base
Basic	25.50 base

On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload)	$100.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	$32.00
Domestic, 26 to 28%	39.50

Electric Ferrosilicon

Per Gross Ton Delivered; Lump Size

50% (carload lots, bulk)	$69.50*
50% (ton lots, packed)	82.00*
75% (carload lots, bulk	126.00*
75% (ton lots, packed)	142.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio

Per Gross Ton

10.00 to 10.50%	$33.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2%, $1 per ton additional.
Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50% $27.50
For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.
The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.
Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon .....11.00c.
2% carbon .....17.50c.
1% carbon .....18.50c.
0.10% carbon .....20.50c.
0.06% carbon .....21.00c.
Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size. Bulk, on Contract

3% carbon $98.00*
2.50% carbon 103.00*
2% carbon 108.00*
1% carbon 118.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W. del., carload $2.00
Ferrotungsten, 100 lb. and less 2.25
Ferrovanadium, contract, per lb. contained V., del'd $2.70 to $2.90†
Ferracolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots $2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton $142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton $157.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton $58.50
Ferrophosphorus, electrolytic 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, $3 unitage, freight equalized with Nashville $75.00
Ferromolybdenum, per lb. Mo f.o.b. furnace 95c.
Calcium molybdate, per lb. Mo f.o.b. furnace 80c.
Molybdenum oxide briquettes 48-52% Mo per lb. contained Mo f.o.b. Langeloth, Pa. ..... 80c.

*Spot prices are $5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

*ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, bessemer, 51.50% $4.75
Old range, non-bessemer, 51.50% 4.60
Mesaba, bessemer, 51.50% 4.60
Mesaba, non - bessemer, 51.50% 4.45
High phosphorus, 51.50%. 4.35

Foreign Ores*

C.i.f. Philadelphia or Baltimore, Exclusive of Duty

Per Unit

Algerian, low P, Cu free, dry, 55 to 58% Fe .... 14c.
Caucasian, washed, 52% Mn ..... 50c.
African, Indian, 44 to 48% Mn ..... 46c.
African, Indian, 49 to 51% Mn ..... 49c.
Brazilian, 46 to 48% Mn. 47c.
Cuban, del'd, duty free, 51% Mn ..... 62c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered .....$23.00 to $23.50
Tungsten, domestic scheelite del'd..... 23.00 to 23.50
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade) $19.00
Rhodesian, 45% 22.00
Rhodesian, 48% 26.00 to 27.00

*All foreign ore prices are nominal. War conditions have prevented trading in Swedish and Turkish ores and all quotations have therefore been withdrawn.

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail $21.00
Domestic, f.o.b. Ohio River landing barges.. 21.00
No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines .....$20.00 to 22.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid $25.00 to $25.50
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines $31.00
ditto, in bags, f.o.b., same mines $32.60

FUEL OIL

Per Gal.

No. 3, f.o.b. Bayonne, N. J. .....5.10c.
No. 6, f.o.b. Bayonne, N. J. .....3.57c.
No. 5 Bur. Stds., del'd Chicago .....3.25c.
No. 6 Bur. Stds., del'd Chicago .....2.75c.
No. 3 distillate, del'd Cleveland .....5.25c.
No. 4 industrial, del'd Cleveland .....5.00c.
No. 5 industrial, del'd Cleveland .....3.75c.
No. 6 industrial, del'd Cleveland .....3.25c.

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, Prompt .....$4.00 to $4.25
Foundry, f.o.b. Connellsville, Prompt .....$5.25 to $5.50
Foundry, by-product Chicago ovens $10.50
Foundry, by-product delivered New England $12.50
Foundry, by-product delivered Newark or Jersey City, $11.38 to $11.90
Foundry, by-product Philadelphia $11.13
Foundry, by-product delivered Cleveland $11.05
Foundry, by-product delivered Cincinnati $10.50
Foundry, Birmingham...$7.50
Foundry, by-product delivered St. Louis industrial district .....$10.75 to $11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports $14.75

REFRACTORIES PRICES

Fire Clay Brick

Per 1000 f.o.b. Works

Super-duty brick, at St. Louis $60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois 47.50
First quality, New Jersey 52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois 42.75
Second quality, New Jersey 49.00
No. 1 Ohio 39.90
Ground fire clay, per ton 7.10

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania $47.50
Chicago District 55.10
Birmingham 47.50
Silica cement per net ton (Eastern) 8.55

Chrome Brick

Net per Ton

Standard f.o.b. Baltimore, Plymouth Meeting and Chester $50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa. 50.00

Magnesite Brick

Net per Ton

Standard f.o.b. Baltimore and Chester $72.00
Chemically bonded, f.o.b. Baltimore 61.00

Grain Magnesite

Net per Ton

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks) ..... (—)*
Domestic, f.o.b. Baltimore and Chester in sacks.. 40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk) .. 22.00

* None available.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Ferromanganese, export .....£17 18s.
Tin plate, per base box .....32s. to 33s.
Steel bars, open hearth .....13£ 9s.
Beams, open hearth 12£ 2s. 6d.
Channels, open hearth .....12£ 2s. 6d.
Angles, open hearth 12£ 2s. 6d.
Black sheets, No. 24 gage 17£ max.*; 17£ min.**
Galvanized sheets, No. 24 gage 19£ 10s. max.*; 19£ 10s. min.**

* Empire markets only.
** Other than Empire markets.

CONTINENTAL

Per Gross Ton, Belgian Francs
f.o.b. Continental Ports

Bars, merchant 1500
Plates 1750
Joists 1475
Sheets, thin 1900

Above prices are minimum base to which 100 francs should be added to cover war risk insurance, freight charges, etc.

WAREHOUSE PRICES

Base Prices, Dollars per 100 lb., Delivered Metropolitan Areas

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	St. Louis	St. Paul	Milwaukee
Sheets, hot rolled	$3.15	$3.05	$3.15	$3.35	$3.38	$3.23	$3.05	$3.71	$3.18	$3.60	$3.48
Sheets, cold rolled	...	4.10	4.05	4.35	4.40	4.30	4.30	4.78	4.12	4.95	4.43
Sheets, galv.	4.75	4.60	4.72	5.00	4.50	4.84	4.45	4.86	4.95	5.00	4.98
Strip, hot rolled	3.40	3.40	3.30	3.75	3.76	3.48	3.62	4.06	3.52	...	3.73
Strip, cold rolled	3.00	3.30	3.20	3.31	3.31	3.20	3.22	3.46	3.41	3.83	3.54
Plates	3.40	3.55	3.40	3.55	3.76	3.60	3.62	3.85	3.47	3.80	3.68
Structural shapes	3.40	3.55	3.58	3.55	3.75	3.65	3.40	3.85	3.47	3.80	3.68
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.62	3.75	3.62
Bars, cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.02	4.34	3.88
Bars, hot rolled SAE 2300	7.20	7.10	7.30	7.31	7.35	7.42	7.10	7.50	7.47	7.45	7.33
Bars, hot rolled SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	6.02	6.00	5.88
Bars, cold drawn SAE 2300	8.15	8.15	8.15	8.56	8.59	8.45	8.15	8.63	8.52	8.84	8.38
Bars, cold drawn SAE 3100	6.75	6.75	6.75	7.16	7.19	7.05	6.75	7.23	7.12	7.44	6.98

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, less than 1500 lb., cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb.; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb.; galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 150 to 499 lb.; New York, hot rolled sheets, 0 to 1999 lb., galvanized sheets, any quantity, cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb. Extras for size, quality, etc., apply on above quotations.

FABRICATED STEEL

AWARDS

NORTH ATLANTIC STATES

650 **Tons,** Harrisburg, Pa., State viaduct, to Bethlehem Steel Co., Bethlehem, Pa.

250 **Tons,** Farmingdale, N. Y., factory building for Ranger Engineering Corp., to Belmont Iron Works, Philadelphia.

170 **Tons,** Dunkirk, N. Y., building extension for Allegheny Ludlum Steel Corp., to R. S. McMannus Steel Construction Co., Buffalo.

150 **Tons,** Grove City, Pa., dormitories for Grove City College, to Pittsburgh Bridge & Iron Co., Pittsburgh.

100 **Tons,** Passaic, N. J., J. Forstmann Library, to Selbach-Meyer Co., West New York, N. Y.

SOUTH AND SOUTHWEST

1100 **Tons,** Franklin, Tenn., transmission towers for TVA, to American Bridge Co., Pittsburgh.

290 **Tons,** Charleston, W. Va., alterations to Diamond, Inc., building, to Ingalls Iron Works Co., Birmingham.

256 **Tons,** Meridian, Tex., State highway bridge, to Bethlehem Steel Co., Bethlehem, Pa.

253 **Tons,** Raton, N. M., State highway bridge, to Des Moines Steel Co., Des Moines.

175 **Tons,** Pulaski County, Ark., bridge, to Virginia Bridge Co., Roanoke, Va.

165 **Tons,** Augusta, Ga., Kress store, to an unnamed fabricator.

150 **Tons,** Dallas, Tex., Kress store, to Mosher Steel Co., Dallas.

115 **Tons,** Charleston, W. Va., Catholic high school, to Ingalls Iron Works Co., Birmingham.

CENTRAL STATES

600 **Tons,** Mount Gilead, Ohio, building for Hydraulic Press Mfg. Co., to Fort Pitt Bridge Works Co., Massillon, Ohio, through Austin Co., Cleveland.

180 **Tons,** Sleepy Eye, Minn., State highway bridge, to Illinois Steel Bridge Co., Jacksonville, Ill.

175 **Tons,** Wellman, Iowa, State highway bridge, to Clinton Bridge Works, Clinton, Iowa.

WESTERN STATES

1400 **Tons,** Pearl Harbor, T. H., and Bremerton, Wash., caisson gates for Navy yards (Specification 9440), to Moore Dry Dock Co., Oakland, Cal.

280 **Tons,** Sunnyvale, Cal., technical service building at Moffett Field, to Moore Dry Dock Co., Oakland, Cal., through Carl Swenson, San Jose, Cal., contractor.

217 **Tons,** Yellowstone Park, Wyo., bridge for Public Roads Administration, to Bethlehem Steel Co., Bethlehem, Pa., through Lowdermilk Brothers, Denver, contractor.

PENDING STRUCTURAL PROIECTS

NORTH ATLANTIC STATES

500 **Tons,** Chester, Pa., vocational high school.

390 **Tons,** Mountain Lakes, N. J., railroad underpass.

220 **Tons,** Storrs, Conn., State dormitory for women.

200 **Tons,** Springfield, Vt., factory building for Jones & Lamson Machine Co.

160 **Tons,** Elmira, N. Y., office building for New York State Electric & Gas Co.

135 **Tons,** New Brunswick, N. J., addition to high school.

130 **Tons,** Willington, Conn., Wilbur Cross State Parkway bridge.

125 **Tons,** Chester, Pa., housing project.

120 **Tons,** Pittsfield, Pa., State overpass.

120 **Tons,** Troy, N. Y., building addition for New York Telephone Co.

120 **Tons,** Crawford-Warren Counties, Pa., State highway bridge.

120 **Tons,** Falls, Md., bridge No. 228 for Western Maryland Railroad Co.

115 **Tons,** Warren County, Pa., I-beam bridge.

THE SOUTH

550 **Tons,** Huttonsville, W. Va., medium security prison for W. Va. Board of Control.

520 **Tons,** State of Oklahoma, four highway bridges; bids June 4.

330 **Tons,** Richmond, Va., store building for Thalimer Bros., Inc.

CENTRAL STATES

750 **Tons,** Toledo, Ohio, office and factory building for City Machine & Tool Co.

450 **Tons,** Streator, Ill., extensions to warehouses for Owens-Illinois Glass Co.

450 **Tons,** Mississippi River guide wall extensions, locks and dams Nos. 11, 16, 18, 20, 21; bids by United States Engineers at Rock Island, Ill., May 8.

400 **Tons,** Chicago, repairs, Chicago Rapid Transit Co.

200 **Tons,** St. Louis, Gravois Avenue underpass at Missouri Pacific tracks; G. L. Tarlton Contractor, Inc., St. Louis, low bidder on general contract.

170 **Tons,** Faribault, Minn., State bridge No. 5337.

160 **Tons,** Piedmont, Mo., Clearwater Dam; United Construction Co., Winona, Minn., low bidder on general contract.

100 **Tons,** Clermont County, Ohio, State project No. 29; Contractors Finance Corp., Cincinnati, general contractor (previously reported).

100 **Tons,** Harrison County, Ohio, State project No. 30; W. M. Brode, Newcomerstown, general contractor (previously reported).

WESTERN STATES

1600 **Tons,** Kettle Falls, Wash., Kettle Falls bridge; bids May 7.

1300 **Tons,** Fairbanks, Alaska, Government air base hangar.

500 **Tons,** Odair, Wash., heating and seat plate assemblies for spillway ledge heating equipment at Grand Coulee Dam; Schmitt Steel Co., Portland, Ore., low bidder.

360 **Tons,** Los Angeles, bearing piles for Brea Dam; bids June 5.

200 **Tons,** Fairbanks, Alaska, air base power house.

180 **Tons,** Los Angeles, railroad bridges at Sepulveda Dam across Los Angeles River and Bull Creek; bids about June 15.

125 **Tons** Odair, Wash., bulkhead gate tracks for Grand Coulee Dam; John W. Beam, Denver, low bidder.

120 **Tons,** Rexford, Mont., State bridge FAP-137-B (1).

FABRICATED PLATES

AWARDS

450 **Tons,** Chicago, city water pipe project, to Chicago Bridge & Iron Co., Chicago.

PENDING PROJECTS

4100 **Tons,** Los Angeles, Metropolitan Water District distribution line if steel pipe alternate is used; bids May 14.

700 **Tons,** Sunnyvale, Cal., wind tunnel at Moffett Field; Moore Dry Dock Co., Oakland, Cal., low bidder.

130 **Tons,** Piedmont, Mo., liner plates for Clearwater Dam, United Construction Co., Winona, Minn., low bidder on general contract.

SHEET PILING

AWARDS

1770 **Tons,** Cleveland, Cuyahoga River improvement, 655 tons, cuts 9-C and 5-A, contract No. 21; 575 tons, cut No. 1, contract No. 24; 540 tons, cut No. 8, contract No. 33, all to Carnegie-Illinois Steel Corp., Pittsburgh, through Great Lakes Dredge & Dock Co., Cleveland.

206 **Tons,** Cleveland, West 40th Street overpass, to Inland Steel Co., Chicago, through Lombardo Bros., Cleveland.

PENDING PROJECTS

4000 **Tons,** Denison, Tex., Denison Dam; Guy F. Atkinson, San Francisco, low bidder.

265 **Tons,** Brea, Cal., Brea Dam; bids June 5.

225 **Tons,** Los Angeles, railroad bridges at Sepulveda Dam across Los Angeles River and Bull Creek; bids about June 15.

423 **Tons,** Cleveland, sheet and H-piling for Cuyahoga River improvement, Contract No. 32, L. A. Wells Construction Co., Cleveland, low bidder.

175,950 **sq ft.,** improvements to locks and dams Nos. 11, 16, 18, 20 and 21, Mississippi River; bids at Rock Island, Ill., May 8.

144 **Tons,** Golconda, Ill., Mississippi River flood protection work; bids May 28.

. . . PIPE LINES . . .

Gulf Pipe Line Co., Gulf Building, Houston, Tex., affiliated with Gulf Oil Corp., same address, plans new welded steel pipe line from oil field at Pittsburg, Tex., to connection with main trunk line from Oklahoma to east Texas district, about 25 miles, for crude oil transmission; also steel pipe line gathering system in Pittsburg oil district, totaling about 30 miles, with booster pumping stations and other operating facilities. Another pipe line gathering system will be installed in oil field near Tipton, Okla., about eight miles.

District Quartermaster, Sparta CCC District, Sparta, Wis., closes bids May 8 for steel pipe (Circular 5605-114).

Metropolitan Water District, 306 West Third Street, Los Angeles, will take bids at once for section of new welded steel pipe line from San Rafael tunnel No. 2, at upper end of main feeder line for Burbank, to Arcadia reservoir on Bundy Drive, Santa Monica, about 25 miles, for water supply for last noted city. Bids also will be asked soon for pipe line from water-softening plant at La Verne to Santa Ana, about 25 miles, forming first section of Orange County pipe line system for water distribution to Santa Ana, Anaheim and Fullerton. Bids will be asked later in year for other pipe lines for system, with entire project scheduled for completion early in 1941. R. B. Diemer is division engineer in charge of distribution system of Los Angeles aqueduct.

Nacogdoches, Tex., has voted bonds for $150,000 at special election for pressure pipe line system for municipal natural gas distribution, including main welded steel pipe line for connection with supply source, control station, meter house and other operating facilities. J. E. Ward, Harvey-Snider Building, Wichita Falls, Tex., is consulting engineer.

Metropolitan Utilities District, Eighteenth and Harney Streets, Omaha, plans pipe lines for gas distribution in part of Dundee district. Cost close to $100,000. Also will make improvements and replacements in gas pipe lines in other sections of city. Cost about $50,000. Pipe lines for water distribution are planned in districts Nos. 1610 and 1612, recently created. J. C. Detweiler is construction engineer.

United States Engineer Office, Vicksburg, Miss., closes bids May 3 for 10,000 ft. of 2-in. black wrought steel pipe (Circular 196).

Canadian Oil Co., Preolia, Ont., has approved plans for new 4-in. welded steel pipe line to Froomfield district, about five miles, where new steel tanks and other terminal facilities for oil-handling will be installed. Entire project will cost close to $100,000.

Transit & Storage Co., Ltd., Sarnia, Ont., plans new 8-in. welded steel pipe line for crude oil transmission, about 70 miles, forming loop with present main line. Cost over $800,000 with booster stations and other operating facilities.

CAST IRON PIPE

Hartford, Conn., metropolitan district commission has awarded 517 tons of 6, 8 and 12-in. pipe to Florence Pipe, Foundry & Machine Co., Philadelphia.

City Council, Philadelphia, has been authorized at election, April 23, to arrange bond issue of $18,000,000 for expansion and improvements in water system. Of this amount, about $4,550,000 will be used for pipe lines for main supply lines and distribution system, including extensions and replacements in different parts of city. A 60-in. line will be build from Queen Lane station, where two new pumping units will be installed with capacity of about 45,000,000 gal. per day; also two new pumping plants will be built to develop an output of 355,000,000 gal. per day, as well as booster stations in different localities. New filters and other water-treatment equipment will be installed at Belmont station, at estimated cost of $1,860,000; similar equipment at Queen Lane station will cost about $3,072,000; and at the Torresdale sta-

tion, $4,720,000. Bids for different features of work are scheduled to be asked during summer. Morris Knowles, Inc., and Nathan B. Jacobs, Westinghouse Building, Pittsburgh, are consulting engineers. John H. Neeson is director of Department of Public Works, City Hall. It is estimated that entire project will require from 36 to 42 months for completion.

Winnsboro, Tex., has plans for pipe lines for water system and other waterworks installation. Fund of $81,700 has been arranged for this and extensions in sewage system. Albert C. Moore & Co., Smith-Young Tower Building, San Antonio, Tex., are consulting engineers.

Ableman, Wis., plans pipe lines for water system and other waterworks installation, including pumping station, storage tank, etc. Cost about $83,000. Special election has been called on May 21 to approve bond issue for $25,000, remainder of fund to be secured through Federal aid.

Board of Water Commissioners, 62 Lewis Street, Rahway, N. J., asks bids until May 14 for 2471 ft. of 16-in. pipe and 1822 ft. of 12-in. for main water supply. C. W. Ludlow is superintendent.

Board of DeKalb County Commissioners, Decatur, Ga., plans pipe lines for water system from Doraville to Panthersville, including number of branch lines for service in rural sections in that area. Main water supply line will be built for connection with existing trunk mains at Decatur. Project will include new intake station on Chattahoochee River, and filtration plant near Doraville. Cost about $1,775,000, of which approximately $800,000 is being secured through Federal aid; negotiations for latter financing are under way.

General Purchasing Officer, Panama Canal, Washington, asks bids until May 7 for 5000 ft. of 8-in. cement-lined cast iron water pipe; also for cast iron water pipe fittings (Schedule 4022).

Glendale, Cal., has awarded 4000 ft. of 12-in. and 6000 ft. of 8-in. pipe (Class 250) to National Cast Iron Pipe Co., Los Angeles, and 200 ft. of 20-in. and 500 ft. of 16-in. pipe (Class 250) and fittings to United States Pipe & Foundry Co., San Francisco.

Santa Rosa, Cal., asks bids May 7 on 16,500 ft. of 8-in. and 4010 ft. of 12-in. pipe.

San Diego, Cal., has opened bids on 288 ft. of 6-in. and 4716 ft. of 12-in. pipe.

Whittier, Cal., will ask bids May 6 on 10,000 ft. of 6-in. pipe.

REINFORCING STEEL

. . . Awards of 4150 tons; 10,850 tons in new projects

AWARDS

ATLANTIC STATES

150 Tons, Nazareth, Pa., Penn Dixie Cement Co. building, to Bethlehem Steel Co., Bethlehem, Pa., through Santer & Schwertner, contractors.

150 Tons, Hartford, Conn., aircraft manufacturing plant addition to Truscon Steel Co., Boston.

SOUTH AND CENTRAL

500 Tons, Huntington, W. Va., flood wall, U. S. Engineer, to West Virginia Rail Co., through R. B. Potashnic, contractor.

150 Tons, Marion, Ind., bridge, to Truscon Steel Co., Youngstown.

140 Tons, Cleveland, Bulkley Boulevard and West 49th Street bridge, for Cuyahoga County, to Builders Structural Steel Co., Cleveland, through Lombardo Bros., Cleveland.

114 Tons, Dunkirk, N. Y., grade elimination, to Bethlehem Steel Co., Bethlehem, Pa., through C. B. Moon Co., general contractor.

100 Tons, Hammond, Ind., sewage treatment plant, to Joseph T. Ryerson & Son, Inc., Chicago.

WESTERN STATES

2650 Tons, Coram, Cal., Shasta power plant (Invitation 33,444-A), to Columbia Steel Co., San Francisco.

190 Tons, Sunnyvale, Cal., technical service building at Moffett Field, to San Jose Steel Co., San Jose, Cal. through Carl Swenson, San Jose, Cal., contractor.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

2000 Tons, Brooklyn, Long Island Railroad subway; Poirier & McLane, low bidders.

300 Tons, Batavia, N. Y., highway project F.A.R.C. 40-18.

290 Tons, Salamanca, N. Y., including 50 tons structural steel, highway project F.A.R.C. 40-17.

280 Tons, North Creek, N. Y., highway project F.A.R.C. 40-20.

280 Tons, Tupper Lake, N. Y., highway project F.A.R.C. 40-21.

225 Tons, Plattsburg, N. Y., highway project F.A.R.C. 40-9; bids close May 15.

145 Tons, Suffolk County, N. Y., grade separation, Southern State Parkway, S.S.P. 40-2.

140 Tons, Saranac Lake, N. Y., highway project F.A.R.C. 40-11.

100 Tons, Skinnersville, N. Y., highway project F.A.R.C. 40-10.

SOUTH AND CENTRAL

1250 Tons, Mississippi River improvements to locks and dams Nos. 11, 16, 18, 20 and 21; bid at Rock Island, Ill., May 8.

1000 Tons, Kanapolis, Kan., dam, U. S. Engineer.

800 Tons, Cincinnati, Winton Terrace housing project; bids April 25.

750 Tons, Piedmont, Mo., Clearwater Dam; United Construction Co., Winona, Minn., low bidder on general contract.

450 Tons, Evanston, Ill., foundations, Northwestern Technological Institute, R. C. Wieboldt, Co., Chicago, contractor.

434 Tons, St. Louis, Gravois Avenue underpass at Missouri Pacific tracks; G. L. Tarlton Contractor, Inc., St. Louis, low bidder on general contract.

361 Tons, Indianapolis, flood wall, David M. Johnson, Inc., Newark, low bidder.

350 Tons, Greenville Springs, La., tuberculosis sanitarium; Norman Construction Co., Lake Charles, La., low bidder on general contract.

300 Tons, Detroit, Rackham Engineering Club; W. E. Wood Co., contractor.

250 Tons, Chicago, garages, 125 S. Wabash Ave.

200 Tons, Huttonsville, W. Va., medium security prison; bids taken May 1.

200 Tons, South Chicago, Ill., addition, Wisconsin Steel Co.

135 Tons, State of Oklahoma, four highway bridges; bids June 4.

135 Tons, Golconda, Ill., flood protection wall, Mississippi River; bids May 28.

WESTERN STATES

260 Tons, Los Angeles, bridges at Sepulveda Dam across Los Angeles River and Bull Creek; bids about June 15.

250 Tons, Odair, Wash., Grand Coulee Dam (Invitation B-38246-A); bids in.

235 Tons, Oakland, Cal., Loose-Wiles Biscuit Co. plant; bids in.

148 Tons, Newkirk, N. M., Tucumcari project (Invitation 32796-A); bids in.

CANAL ZONE

750 Tons, Panama Canal buildings for Army Department.

U. S. Steel Earns Net of $17,113,995

NET earnings of U. S. Steel Corp. for the first quarter of the current year, after depreciation, taxes and interest, were $17,113,995, equal to $1.24 per common share outstanding, according to an announcement made Tuesday by E. R. Stettinius, Jr., chairman of the board. This compares with $28,729,177 in the fourth quarter of 1939, and $660,551 in the first quarter of 1939. In the first three months of 1937 net profit was $28,561,553.

The regular preferred quarterly dividend of $1.75 a share was declared. This was in addition to the $1 common dividend declared March 26. Deducting both the quarter's common and preferred dividends resulted in a surplus for the period of $2,105,824.

Shipments of steel products during the quarter were 3,086,753 net tons, or 66.9 per cent of capacity, Mr. Stettinius reported. Shipments in the last quarter of 1939 were 4,196,029 tons, or 86.9 per cent, and in the first quarter of 1939 were 2,463,409 tons, or 51.7 per cent. Shipments in first three months of 1937 were 4,084,361 net tons, or 84 per cent of capacity.

Employees in the first three months of the present year averaged 244,031, up to 16.8 per cent over the corresponding period of 1939, while payrolls totaled $99,135,515, a gain of 19.3 per cent over the first quarter of 1939.

E. T. Weir Sees No "Unusual Optimism"

PITTSBURGH—Whether or not there will be an important stimulus to steel operations in May and June because of the sudden withdrawal of low prices on sheets and strip depends upon the confidence steel buyers have that the new quotations will be effective on shipments after June 30, E. T. Weir, chairman, National Steel Corp., said here this week in reporting his company's first quarter earnings.

"If there is a slight bulge in flat rolled business during the remainder of this quarter because of the price situation, such tonnage will probably be at the expense of the third quarter," Mr. Weir said.

National Steel Corp.'s net earnings for the first quarter of 1940 amounted to $4,009,193, or $1.82 a share, compared with $5,292,331, or $2.40 a share, earned in the final quarter of 1939. Current operations of National Steel, Mr. Weir stated, are approximately 75 per cent of capacity but he expressed doubt that this rate of operation would be maintained by his company throughout the present quarter.

"There is no unusual optimism on the part of buyers and consumers of steel as regards to activity in this quarter," Mr. Weir said. "Consumers today have no interest whatever in increasing their inventory position but they are interested in reducing their inventories to a point more consistent with actual consumption. This point has probably been reached now and is reflected in current steel industry operating rates," Mr. Weir added.

Government Orders

WASHINGTON — Government contracts for iron and steel products, as reported by the Labor Department's Public Contract Division for the week ended April 20, totaled $417,763. For the same period contracts totaled $232,362 for non-ferrous metals and alloys; $2,356,447 for machinery; and $1,334,629 for transportation equipment. Details follow:

Iron and Steel Products

Widin Metal Goods Co., Garwood, N. J., Philadelphia Navy Yard, release mechanism $12,042
MacWhyte Co., Kenosha, Wis., Philadelphia Navy Yard, tie rods 13,817
Elastic Stop Nut Corp., Elizabeth, N. J., Philadelphia Navy Yard, self locking nut 25,997
Air Associates, Inc., Garden City, N. Y., Philadelphia Navy Yard, steel bolts 28,596
Aluminum Co. of America, Washington, D. C., Philadelphia Navy Yard, rivets 11,868
Aluminum Co. of America, Washington, D. C., Philadelphia Navy Yard, bolts, nuts, washers 14,708
The Corbin Screw Corp., The American Hardware Corp., Successor, New Britain, Conn., Philadelphia Navy Yard, machine screws 12,555
Telephonics Corp., New York City, Philadelphia Navy Yard, reel assey, antenna 17,160
Colorado Fuel & Iron Corp., Denver, Panama Canal, railway tie plates .. 25,000
May Hardware Co., Washington, D. C., Procurement, hardware .....Indefinite
Judson Steel Corp., Oakland, Cal., WPA, reinforcing steel .....Indefinite
United States Pipe & Foundry Co., Chicago, WPA, cast iron water pipe 17,403
Snap-On Tools Corp., Kenosha, Wis., War Air Corps, socket wrench handles 15,915
Penn Rivet Corp., Philadelphia, War Air Corps, aluminum alloy rivets..Indefinite
Link-Belt Co., Indianapolis, War Ordnance, roller chains 15,125
Crown Iron Works Co., Minneapolis, Navy Marine Corps, piers 36,738
United States Pipe & Foundry Co., Philadelphia, Panama Canal, cast iron pipe 40,863
National Cast Iron Pipe, A Division of James B. Clow & Sons, Kansas City, WPA, cast iron water pipe .. 12,629
Chicago Bridge & Iron Co., Chicago, War Engineer Corps, plate lining.. 68,960
The American Steel & Wire Co. of N. J., Chicago, War Engineer Corps, wire strand 34,351
The Otis Steel Co., Cleveland, Navy Marine Corps, flat steel sheets 13,530

Non-Ferrous Metals and Alloys

Aluminum Co. of America, Washington, D. C., Philadelphia Navy Yard, aluminum-alloy tubing $14,333
The American Brass Co., Waterbury, Conn., Navy Purchasing Office, copper-nickel-alloy tubing 21,121
United States Steel Export Co., Washington, D. C., Panama Canal, copper wire 13,096
Aluminum Co. of America, Pittsburgh, TVA, electrical conductor 88,501
The Aluminum Products Co., LaGrange, Ill., War CCC, aluminum stock pots 11,304
Federal Screw Works, Detroit, War Ordnance, metal fuze components.. 72,040
The International Nickel Co., Inc., New York City, Navy S&A, nickel-copper-alloy .....Indefinite
The International Nickel Co., Inc., New York City, Navy S&A, nickel-copper-alloy 11,963

Machinery

Dexter Folder Co., Pearl River, N. Y., GPO, folding machines $23,100
Crane Co., South Boston, Boston Navy Yard, valves 9,057
Manning, Maxwell & Moore Co., Boston, Boston Navy Yard, valves 44,572
The Baldwin Locomotive Works, Eddystone, Pa., TVA, turbines and governors 1,385,646
The Colson-Merriam Co., Washington, D. C., Veterans Administration, electric tray conveyors 11,474
The E. A. Kinsey Co., Cincinnati, War Air Corps, shapers 55,976
The C. H. Gosiger Machinery Co., Dayton, Ohio, War Air Corps, drill presses 17,275
Lima Locomotive Works, Inc., Shovel & Crane Division, Memphis, Tenn., War Engineer Corps, dragline excavator 23,250
Bay City Shovels, Inc., Bay City, Mich., War Engineer Corps, crane and excavator 10,350
General Machinery Corp., Niles Tool Works Division, Hamilton, Ohio, War Ordnance, boring lathes 112,550
Brown & Sharpe Mfg. Co., Providence, Navy S&A, milling machines 51,616
Perine Machinery & Supply Co., Inc., Seattle, Navy S&A, boring machine 15,804
Wm. Sellers & Co., Inc., Philadelphia, Navy S&A, machines 64,895
The Carlton Machine Tool Co., Cincinnati, Navy S&A, radial drill 25,079
Ingersoll-Rand Co., Washington, D. C., Navy S&A, feed pumps 275,561
Rivett Lathe & Grinder, Inc., Brighton, Mass., National Advisory Commission for Aeronautics, toolmaker's lathes 11,408
Kearney & Trecker Corp., Milwaukee, Navy S&A, milling machines 17,642
Buffalo Forge Co., Washington, D. C., Navy S&A, ventilation equipment.. 21,627
Clark Equipment Co., Clark Tructractor Division, Battle Creek, Mich., War Air Corps, tractors 179,561

Transportation Equipment

Eclipse Aviation, Division of Bendix Aviation Corp., Bendix, N. J., Philadelphia Navy Yard, starters $14,245
Consolidated Aircraft Corp., San Diego, Cal., Philadelphia Navy Yard, parts for planes 10,222
United Aircraft Corp., Vought-Sikorsky Aircraft Division, Stratford, Conn., Philadelphia Navy Yard, airplane parts 65,306
Grumman Aircraft Engineering Corp., Bethpage, L. I., N. Y., Philadelphia Navy Yard, airplane parts 15,886
Aircraft Accessories Corp., Glendale, Cal., Philadelphia Navy Yard, airplane parts 29,627
Douglas Aircraft Co., Inc., Santa Monica, Cal., Naval Supply Depot, airplane spares 34,275
Airstream Trailers, Los Angeles, Cal., WPA, trailers 17,938
Air Associates, Inc., Garden City, N. Y., War Air Corps, propeller test stand asseys 41,160
The Baker-Raulang Co., Cleveland, War Air Corps, platform trucks ... 33,290
Consolidated Aircraft Corp., San Diego, Cal., Naval Air Station, airplane parts 41,098
United Aircraft Corp., Pratt & Whitney Aircraft Division, East Hartford, Conn., Philadelphia Navy Yard, ball bearings 15,269
Bethlehem Steel Co. (Shipbuilding Div.), Quincy, Mass., Navy Office of Secretary, aircraft carrier plans..Indefinite
United Aircraft Corp., Pratt & Whitney Aircraft Division, East Hartford, Conn., Navy S&A, aircraft engines 696,881
Grumman Aircraft Engineering Corp., Bethpage, L. I., N. Y., Navy S&A, parts for airplanes 11,827
United Aircraft Corp., Pratt & Whitney Aircraft Division, East Hartford, Conn., Navy S&A, aircraft engines 245,569
Greenville Steel Car Co., Greenville, Pa., War Engineer Corps, box cars. 62,032

TRADE NOTES

Foote Bros. Gear & Machine Corp., Chicago, has appointed Continental Gin Co., industrial division, Birmingham, Ala., as its representative in Georgia, Alabama, South Carolina, North Carolina, Florida, and the southern portion of Mississippi. Northern Mississippi will be covered by the Foote company's regular representative, Eugene D. Wilson.

Harry Harris & Co., iron and steel scrap trade firm with offices, yards or docks at New York, Milwaukee, East Chicago, Jacksonville, Fla., Port Everglades, Fla., Tampa, Fla., Miami, Fla., and Havana, is expanding its activity in the pipe and tube business. It has added R. W. Grabois and G. Wittlin to the staff of its New York office at 120 Broadway.

Lawrence H. Wilson, product designer and stylist, announces opening of new offices at 913 Stephenson Building, Detroit. He served in recent years as head stylist for Norge and Detroit Vapor Stove Divisions of Borg-Warner Corp.

National Founders Association has moved to 120 South La Salle Street, Chicago, J. M. Taylor, secretary, has announced.

Jackson Steel Tube Co., Brooklyn, N. Y., has purchased buildings of the Old Favorite Stove & Range Co., Piqua, Ohio, from Samuel Kamin, Lima, Ohio, and will establish a branch plant there.

Henry Nelkin, Inc., electro-platers and polishers, 128 Mott Street, New York, has added a floor to its plant and installed two new departments, baking and enameling, and tumbling. The baking and enameling department includes two 10-ft. x 8-ft. baking ovens and three smaller ovens. The tumbling department includes six new cadmium plating barrels and four of the latest model burnishing barrels and six modern nickel-tumbling barrels.

Seaboard Steel Products Corp., 205 East 42nd Street, New York, has been appointed representative for the Stewart Iron Works, Cincinnati, maker of chain, link and ornamental fences.

Trico Fuse Mfg. Co., Milwaukee, has appointed Mr. L. W. Sloan, 408 Olive Street, St. Louis, Mo., as district sales representative in St. Louis, Missouri and vicinity and Huie-Simmer Co., 103 Thomas Building, Dallas, Tex., as district sales representative in Oklahoma.

Peden Iron & Steel Co., Houston, George T. Morse, manager, has recently been made the Barber-Colman Co. representative in the Texas territory.

Robins Conveying Belt Co., New York, designers and manufacturers of material handling machinery, has erected a three-floor brick office building to house its executive, engineering, sales and other departments. The company's new address, effective May 1, will be Passaic, N. J. A New York sales office will be maintained at 70 Pine Street.

Vega Airplane Co., Burbank, Cal., which recently announced purchase of a new plant at San Fernando Boulevard and Alameda, has moved from quarters adjacent to Lockheed Aircraft Corp., and in 90 days has installed all equipment, established shop procedure and effected considerable reorganization in personnel. New equipment costing $100,000 has been added, including drop hammers, compressors and machine tools.

Vascoloy-Ramet Corp., North Chicago, Ill., announces the appointment of H. Boker & Co., 101 Duane Street, New York, as selling agents for Vascoloy-Ramet tantalum carbide cutting tools and blanks. The Boker company, established in 1837, has been a source of supply for high quality tools and metal products for more than a century. In addition to its New York headquarters, the firm operates branch offices at Chicago, Cleveland, San Francisco and Montreal.

Research and Practice Problems Stressed in A. F. A. Program

(CONCLUDED FROM PAGE 59)

Carnegie-Illinois Steel Corp., South Works, Chicago.

A Graduate Apprentice's Review of His Training, by C. W. Wade, Caterpillar Tractor Co., Peoria, Ill.

Technique of Training Foundry Apprentices, by A. H. Wornom, Newport News Ship Building & Dry Dock Co., Newport News, Va.

CORE ROOM PRACTICE

Thursday—9:00 A. M.

Chairman, E. C. Zirzow, National Malleable & Steel Castings Co., Cleveland.

Discussion leader, Fred Weaver, Great Lakes Foundry Sand Co., Detroit.

FOUNDRY COSTS

Wednesday—2:00 P. M.

Chairman, L. Lee, Liberty Foundry, Inc., Wauwatosa, Wis.

Round Table Discussion of Cost Methods.

FOREMAN TRAINING

Thursday—10:00 A. M.

Chairman, A. D. Lynch, J. I. Case Co., Racine, Wis.

Round Table Discussion.

PATTERNMAKING

Tuesday—2:00 P. M.

Chairman, Vaughan Reid, City Pattern Works, Detroit.

Pattern Coating Materials, by Frank Cech, Cleveland Trade School, Cleveland, and V. J. Sedlon, Master Pattern Co., Cleveland.

Pattern Color Markings, by G. V. Lustig, Barber-Colman Co., Rockford, Ill.

PLANT EQUIPMENT

Monday—8:00 P. M.

Chairman, James Thomson, Continental Roll & Steel Foundry Co., E. Chicago.

Co-Chairmen, R. D. Brizzolaara, American Steel Foundries, Chicago, and W. R. Jennings, John Deere Tractor Co., Waterloo, Ia.

Cooling and Storage of Foundry Sand, by H. L. McKinnon, C. O. Bartlett & Snow Co., Cleveland.

Foundry Equipment at Indianapolis Plant, International Harvester Co., by F. H. Amos, International Harvester Co., Chicago.

REFRACTORIES

Tuesday—8:00 P. M.

Chairman, A. H. Dierker, Ohio State University, Columbus.

Co-Chairman, J. A. Kayser, Laclede-Christy Clay Products Co., St. Louis.

Comparison of Refractories for Cupola Service, by J. A. Bowers and James T. MacKenzie, American Cast Iron Pipe Co., Birmingham.

Linings for Desulphurizing Ladles, by John Lowe, Vilter Mfg. Co., Milwaukee.

ENGINEERING SCHOOL AND PLANT INSTRUCTORS' DINNER

Monday—7:00 P. M.

Presiding, F. G. Sefing, International Nickel Co., New York.

Co-Chairman, C. H. Casberg, Department of Mechanical Engineering, University of Illinois, Urbana, Ill.

Discussion Subject — *Dissemination of Information on Cast Metals to Students.*

SAND RESEARCH

Wednesday—2:00 P. M.

Chairman, W. G. Reichert, American Brake Shoe & Foundry Co., Mahwah, N. J.

Co-Chairman, C. P. Randall, Hunt-Spiller Mfg. Co., Boston.

Flowability of Molding Sands, by P. E. Kyle, Massachusetts Institute of Technology, Cambridge, Massachusetts.

Effect of Sand on the Properties of Cast Iron, by H. W. Dietert and E. E. Woodliff, Harry W. Dietert Co., Detroit.

Effect of Sand on the Properties of Cast Iron, by H. Womochel and C. C. Sigerfoos, Michigan State College, East Lansing, Mich.

Notes on the Clay Bonding of Molding Sand, by Harry L. Daasch, University of Vermont, Burlington, Vt.

Thursday—10:00 A. M.

Chairman, D. L. Parker, General Electric Co., West Lynn, Mass.

Co-Chairman, N. J. Dunbeck, Eastern Clay Products Co., Eifort, O.

Recent Experiments with Gray Iron Synthetic Molding Sands, by Fulton Holtby and Herbert Scobie, University of Minnesota, Minneapolis.

Some Considerations of Effects of High Temperature on Sands, by Dr. H. Ries, Cornell University, Ithaca, N. Y.

Sand Control in British Foundries, by J. J. Sheehan, Austin Motor Co., Ltd., Birmingham, England (Official Exchange Paper—Institute of British Foundrymen).

Report of Technical Director, Foundry Sand Research Committee.

SAFETY AND HYGIENE

Thursday—2:00 P. M.

A Safety Program for Small Foundries, by P. E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, O.

Workmen's Compensation and Occupational Disease Insurance, by Roger Bronson, Chicago.

CRYSTALLIZATION DEMONSTRATION

Close-Ups of Crystal Behavior Illustrated by Microprojection —Demonstration by Dr. C. W. Mason, Cornell University, Ithaca, N. Y.

First Lecture — Tuesday, 8:00 P.M.

Second Lecture — Wednesday, 8:00 P.M.

Third Lecture — Thursday, 4:30 P.M.

Pocket-Size Book Gives Welding Data

CONDENSED information on all types of welding is given in "The Welding Engineer's Pocket Book," 240 pages, 4 x 6½ in., recently published by the Chemical Publishing Co., 148 Lafayette Street, New York.

The section on arc welding includes data on metallic, carbon, and atomic hydrogen arc welding, and on the electric arc as a maintenance tool. A large section is devoted to electric resistance welding, with data on spot, seam, butt and flash, projection, and automatic resistance welding, and on electric brazing. Oxy-acetylene welding, the welding of various metals, and methods of testing, including X-ray, are comprehensively covered. Data on thermit welding, oxygen cutting, and on lead burning, brazing and light sheet metal welding are also included. The price of the book is $1.50.

THESE are truly the days when service is reflected by the foresight and progressiveness of the past—when the keeping of one's house in order during depression periods now pays dividends to customer, dealer and distributor.

The piling-up of unfilled orders, the mad scramble for raw materials and machinery, the breakdown of production facilities, the broken promises on deliveries—all these are the result of lack of confidence and stability, and of delay in the preparation of proper service perspective during slow periods.

For almost a century—since 1845—R B & W has pursued an inflexible policy of keeping its house in order. During many depressions, many booms—and many wars—R B & W has constantly built a background of plant facilities, production methods, raw material sources, and sound sales-engineering service—in bad times as well as good.

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BOLT AND NUT COMPANY

PORT CHESTER, N. Y. ROCK FALLS, ILL. CORAOPOLIS, PA.

THIS WEEK'S MACHINE ...TOOL ACTIVITIES...

...Buying pace unchanged in the aggregate at Cincinnati... Aircraft business heavy but not up to earlier expectations... Machinery buying expected to follow British munitions purchases in the East... State tax problems vex Chicago dealers.

Market Pace Continued At Cincinnati

CINCINNATI—Except for a moderate fluctuation between domestic and foreign ordering, the district machinery market is unchanged from last week. Export business showed a moderate improvement during the past week, but this was offset by a decline in the domestic ordering and left the market in practically the same situation as has obtained in the past three or four weeks. Inquiry, however, from both domestic and foreign sources continues to be definitely active, thus keeping the potential demand at a high level. Virtually all lines of tools are in demand from foreign sources, with the exception of drilling machinery which is predominantly domestic in its interest. Lathe demand, on the other hand, turned predominantly foreign during the past week, while milling machines and grinders continue to hold a fairly even balance between the two. Other machinery shows relatively no change from previous reports. England and France continue to be most active purchasers in the present market, although scattered business from other foreign countries is reported.

Factories in this area continue to run at capacity, with delivery promises ranging from late this fall to the first half of 1941. Labor supply is restricted with many plants indicating that further expansion in operations is possible were there more skilled men available.

40 Per Cent of Sales Going to Aircraft Industry

CLEVELAND — The aircraft business counted upon by machine tool producers for weeks is turning out to be different than promised. Some of the large airplane manufacturers' ambitious projects have evaporated. On the other hand, certain secondary sources such as parts makers are buying more generously than expected. Aviation continues to account for around 40 per cent of domestic sales, according to one machine tool producer here, whose deliveries are extended 10 days more as a result of April bookings which on the domestic side were slightly ahead of the average of the three preceding months.

Reports from local dealers are at variance as the month closes. Some found April comparing very favorably with March, while others noted a decline. Considerable depends on the type of equipment being handled, the state of deliveries and the amount of tooling which can be undertaken in addition to the factors prevalent in more ordinary times.

Ford Holding Up Orders On Tooling for New Six

DETROIT—A surprise blow has come in the hold-up order disseminated generally a week ago to suppliers who were preparing equipment for the Ford six-cylinder car. Apparently there have been no outright cancellations, only the tooling being completely "out." It is therefore considered possible that at least some of the machinery orders may be carried through in cases where the machines can be used on Ford's other projects.

Plans for automatic transmissions for Cadillac, LaSalle, the big Buick and General Motors Truck are being whispered around Detroit. This elaborates on previous information that the Olds Hydramatic transmission would soon be produced in greater volume for Olds and would be supplied in larger sizes for other General Motors vehicles. So far it is not believed that definite tooling programs exist, but it has been intimated that 1941 models of the above mentioned cars and trucks might use the new type transmission. Considerable buying has already been done for a heavier transmission which was reported as being a prospective truck transmission.

Machine deliveries continue to show improvement with many now in the four to six-week range, compared with 20 to 26 weeks, common last fall and winter.

Tax Problems Still Worry Chicago Dealers

CHICAGO—Volume of new orders and inquiries is about even with a week ago, with still no large lists outstanding. Prospects for the next few weeks are good, and most of the activity is expected to be general. Considerable concern is still being expressed over the Illinois State occupational tax situation. The 3 per cent tax is retroactive on all machine tool orders placed after Jan. 29 and not shipped by April 1, and some of the customers affected by this ruling are taking the position that they are not obligated to pay the tax. In such cases the seller has no alternative but to absorb the tax himself unless he chooses to void the order altogether. On current orders the tax is being added to the selling cost of the machines just as any extra expense, such as increased wages, higher raw material cost, etc., would be added. A customer thus has no choice between payment and non-payment of the tax, for the new prices are based upon the increased cost of doing business in the State of Illinois, and are not quoted on a cost plus tax basis. The State Department of Finance is expected momentarily to hand down a decision as to whether a direct sale from an out of state factory to an Illinois buyer, uninfluenced by an Illinois sales agent, will be tax-exempt. Machine tool dealers for obvious reasons are extremely interested in this decision.

British Shell Contract Reported in the East

NEW YORK—American Car & Foundry Co. is understood to have signed a contract for the manufacture of a substantial volume of munitions for the British Government. Estimated steel requirements call for 30,000 tons of forgings. A number of bids are in for high production lathes to be used on this job, but none of the business has been placed thus far. The question of deliveries is paramount. Some lathe makers are tied up far ahead on foreign orders for this class of equipment, but one maker of heavy duty production lathes is able to quote 90 days' delivery. The Buffalo plant of the car company, closed for some months, may be reopened to execute this shell order. Several other heavy machinery manufacturers located in northern New Jersey are also figuring on similar munitions contracts at the present time.

Considerable activity continues in machine tool buying on the part of the aircraft industry. The new Allied orders are so large, however, that the character of the machinery buying is changing from earlier concepts. Fewer machines of a special purpose nature are being bought instead of larger numbers of more general purpose machine tools. Aircraft instrument makers, as well as engine builders, are in the market. Domestic business otherwise is very inactive at the present time.

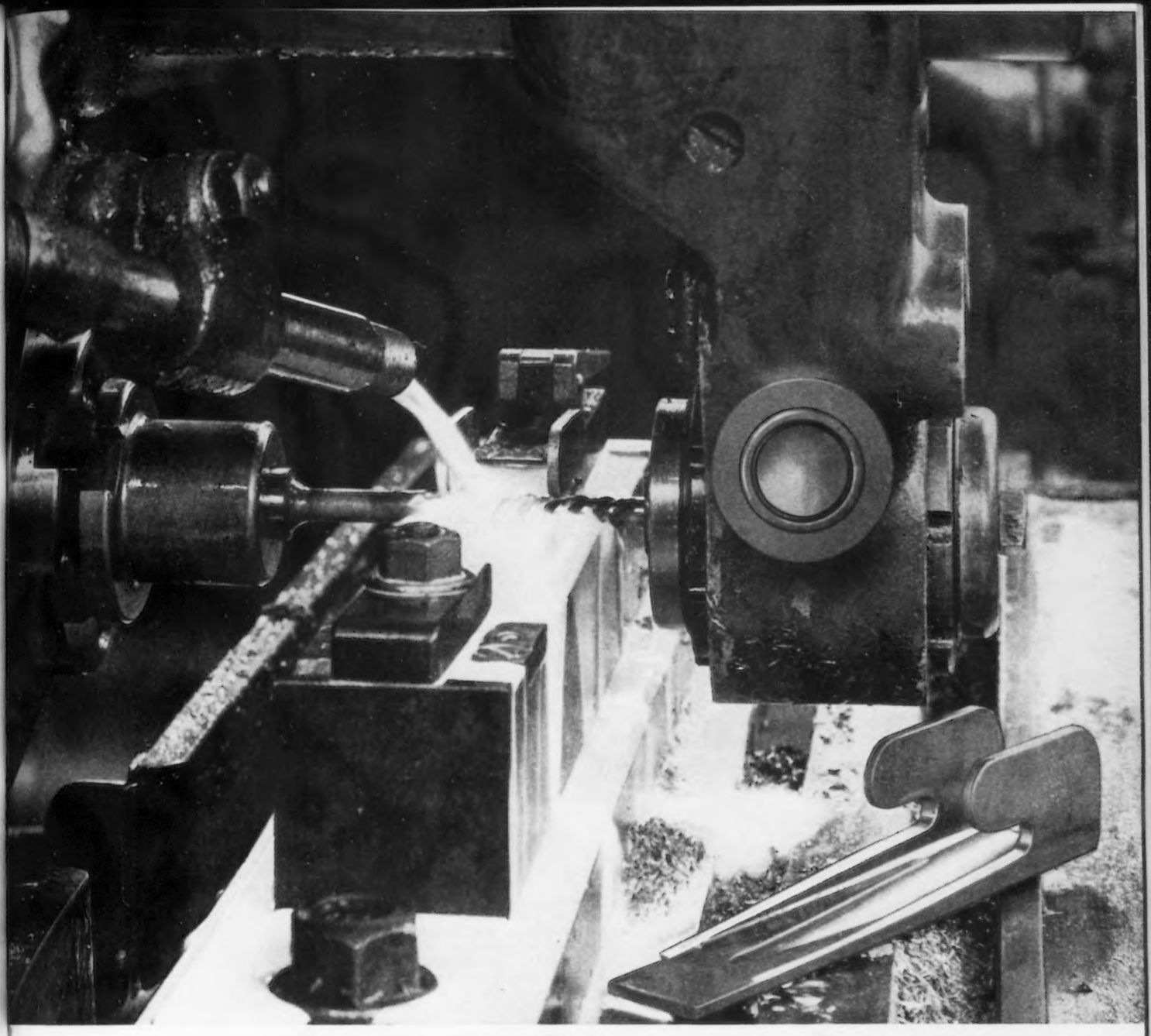
New Coil Spring Company Organized in Michigan

QUALITY SPRING PRODUCTS CO., INC., a new coil spring company, has been organized at Coldwater, Mich., with Wilfred T. Donkin, formerly of Cleveland Wire Spring Co. and the Eaton Mfg. Co., as president.

Earl H. Sortwell, formerly superintendent of the coil spring division, Eaton Mfg. Co., Detroit, is vice-president of the Coldwater company and John A. Kennedy, also formerly of Eaton, is plant accountant.

Giddings & Lewis Drops Cincinnati Purchase

FOND DU LAC, Wis.—Negotiations for the purchase of the Cincinnati Planer Co., by Giddings & Lewis Machine Tool Co., of Fond du Lac, Wis., have been discontinued. H. B. Kraut, president of the Fond du Lac firm, has advised stockholders. Purchase of the Ohio company has been under consideration since last year.



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In photo—a blind cut where accurate table reversal is essential—readily performed on either the No. 10 (shown) or No. 12 Plain Milling Machine. **Investigate** the possibilities of these profitable machines on **your** work. Brown & Sharpe Mfg. Co., Providence, R. I., U. S. A.

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BROWN & SHARPE

PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

American Can Co., 230 Park Avenue, New York, has approved plans for one-story factory branch, storage and distributing plant at Fairport, N. Y., superstructure to begin at once. Cost over $85,000 with equipment.

Tide Water Associated Oil Co., 17 Battery Place, New York, has let contract to E. B. Badger & Sons Co., 75 Pitts Street, Boston, engineer, for unit at oil refinery, Bayonne, N. J., for gasoline production, to replace part of present plant. Cost over $600,000 with machinery.

Quartermaster, West Point, N. Y., asks bids until May 7 for one gasoline-driven portable compressor, and portable air-driven sump pump (Circular 1052-129).

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until May 14 for 14,400,000 to 24,000,000 ft. of wire, and 47,520,000 to 160,802,400 ft. of wire (Circular 394), 4000 to 9000 reels, and 7000 to 30,000 reels (Circular 395); until May 15, 2000 axles (Circular 403).

Ranger Engineering Corp., Conklin Street, Farmingdale, L. I., aircraft engines and parts, subsidiary of Fairchild Engine & Airplane Corp., 30 Rockefeller Plaza, New York, is erecting two-story addition, for which general contract recently was let to Crow Construction Co., 101 Park Avenue, New York. Cost close to $85,000 with equipment. Albert Kahn, Inc., New Center Building, Detroit, is architect and engineer.

Pepsi-Cola Co., North Pearl and Tivoli Streets, Albany, N. Y., has let general contract to A. Panzieri, Inc., Terminal Street, for one-story mechanical-bottling, storage and distributing plant, 108 x 115 ft., in Manands district. Cost about $50,000 with equipment. Gander & Gander, 17 Steuben Street, are architects.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 7 for two welding heads, with rod reels, flux-feeding mechanism and voltage control equipment, 2000 lb. of welding rods and 1000 lb. of welding composition (Schedule 1477) for Brooklyn and Philadelphia Navy yards; two motor-driven generators (Schedule 1485), for Brooklyn; 20 chain hoists, each 10 tons (Schedule 1489), four motor-driven, centrifugal fresh water pumps and spare parts (Schedule 1424), two motor-driven air compressors, with motors and controllers, spare parts, special tools and wrenches (Schedule 1468), four hydraulic pump units, eight hydraulic motors and two sets of spare parts (Schedule 1479) for Philadelphia yard.

Victor Metal Products Corp., 196 Diamond Street, Brooklyn, has filed plans for new one-story plant, 99 x 100 ft. Cost over $40,000 with equipment. Irvin J. Berger, 44 East Fifty-third Street, New York, is architect.

Hercules Powder Co., Delaware Trust Building, Wilmington, Del., has approved plans for expansion in branch plant at Kenvil, N. J., including new production units. Cost close to $500,000 with machinery, mechanical-handling equipment, etc.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until May 6 for cement-coated sinker nails (Circular 1431), one 20-ft. tetryl-graphite blender (Circular 1419; until May 10, 500 aluminum-alloy machined pouring funnels for 81-mm. shells (Circular 1414); until May 20, two automatic drilling time-train ring machines (Circular 1416).

SKF Industries, Inc., Front Street and Erie Avenue, Philadelphia, plans one-story addition. Cost over $400,000 with equipment.

Althouse Chemical Co., 500 Pear Street, Reading, Pa., has let general contract to L. H. Focht & Son, Inc., Reading, for three-story addition. Cost close to $50,000 with equipment.

Supply Officer, Naval Aircraft Factory, Navy Yard, Philadelphia, asks bids until May 6 for aluminum alloy forgings and castings (Aero Req. B-502-3069), interlocking slide fasteners (Aero Req. B-502-3015).

Borough Council, Hatfield, Pa., asks bids until May 6 for 120,000-gal. steel water storage tank, and improvements in present pumping equipment. E. E. Corl, 207 South Twenty-fourth Street, Philadelphia, is consulting engineer.

BUFFALO DISTRICT

Eastman Kodak Co., Kodak Park, Rochester, N. Y., has let general contract to Ridge Construction Co., Kodak Park, for six-story and basement addition, 80 x 215 ft. Cost close to $250,000 with equipment.

United States Engineer Office, Federal Building, Buffalo, asks bids until May 6 for two sets of manganese steel bucket teeth, bolts, nuts, lock washers, etc. (Circular 124).

Ielfield Machinery Co., Silver Creek, N. Y., machinery and parts, plans new one-story plant on Hanover Road. Cost about $50,000 with equipment.

NEW ENGLAND

United Aircraft Corp., East Hartford, Conn., has let general contract to Edwin Moss & Son, Inc., 555 Grant Street, Bridgeport, Conn., for one-story addition to branch plant at Stratford, Conn., used by Vought-Sikorsky Division, 75 x 300 ft. Cost close to $85,000 with equipment.

Public Works Officer, Building 39, Navy Yard, Boston, asks bids until May 7 for one or two new trolleys for 50-ton electric bridge crane in Building 42-A (Specifications 9048).

H. E. Dickerman Mfg. Co., 284 Wilbraham Road, Springfield, Mass., dies, tools, jigs and other mechanical equipment, has let general contract to E. F. Carlson, Inc., 1694 Main Street, for one-story addition, 50 x 100 ft. Cost close to $40,000 with equipment.

F. E. Norton & Sons Co., Manchester Road, Henniker, N. H., fiber board products, plans rebuilding part of mill and boiler plant recently destroyed by fire. Loss close to $65,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 7 for galvanized cast steel wire rope and galvanized plow steel wire rope (Schedule 1418) for Boston, Brooklyn and Mare Island Navy yards; until May 10, one motor-driven hydraulic press (Schedule 1436) for Boston yard.

SOUTH ATLANTIC

Colonial Baking Co., 226 Fifth Street, Augusta, Ga., has let general contract to Wheatley & Mobley Construction Co., Augusta, for new one-story and basement plant. Cost close to $65,000 with traveling ovens, conveyors and other equipment.

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for equipment for power plant at Naval Air Station, Jacksonville, Fla., including boilers, oil burners, combustion control apparatus, draft fans, water-treatment and continuous blow-down equipment, deaerators, fuel oil pumping and heating equipment, gasoline engine-driven alternator, boiler feed pumps, circulating water and sump pumps, air compressors, cooling tower, piping, instruments, switchgear, etc. (Specifications 9415).

Sandoz Chemical Works, Inc., 1510 Camden Road, Charlotte, N. C., has let general contract to V. P. Loftis, Builders' Building, for one-story addition. Cost close to $40,000 with equipment.

WASHINGTON DIST.

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for one 15-ton gantry crane for Pearl Harbor Navy Yard, T. H., comprising revolving hinged jib, A-frame and machinery house mounted on traveling gantry base, operated by d.c. motors, with power secured from self-contained diesel engine power plant (Specifications 9741); also bids (no closing date stated) for steel caisson gates, with pumps, gate valves, fittings, motors and auxiliary equipment, for same yard and Mare Island Navy Yard, San Francisco (Specifications 9488).

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until May 6 for oil barrel pumps, cylinders, paint guns, testers, hydrometers, motor-driven hacksaws, roller car-type jacks, reamers, plugs, welder, wrenches, oil can, vises, air compressors, electric drills, electric grinders, air forge, oil and water separators, and other equipment (Circular 398-191).

Crown Cork & Seal Co., Inc., Eastern Avenue and Cresson Street, Baltimore, has asked bids on general contract for one-story addition to building No. 52. Cost over $45,000 with equipment. Lucius R. White, Jr., 10 West Chase Street, is architect.

General Purchasing Officer, Panama Canal, Washington, asks bids until May 8 for 91 steel sliding gates, 91 steel rolling gates, two steel gate lifting devices (Schedule 4027), 30 50-ton box cars, steel sheathed, riveted or welded, wood-lined 5-ft. gage; and 20 50-ton flat cars, 50 ft. long, 5-ft. gage, steel underframe (Schedule 4015); one 10-in. compound water meter (Schedule 4023); until May 9, three hand-operated grease compressors (Schedule 4025).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 7 for seamless steel tubing (Schedule 1472), motor-driven turret lathe and thread-cutting attachment (Schedule 1484) for Coco Solo, C. Z.; variable speed drive upright test stand for aircraft generators, with motor (Schedule 1466) for Quantico, Va.; dust-collector for grinding and buffing machines, sheet metal piping, etc. (Schedule 1463) for Sewall's Point, Va.; until May 10, motor-driven precision bench lathe (Schedule 1443) for Eastern or Western yard; until May 14, four motor-driven planers (Schedule 1392) for Washington yard.

SOUTH CENTRAL

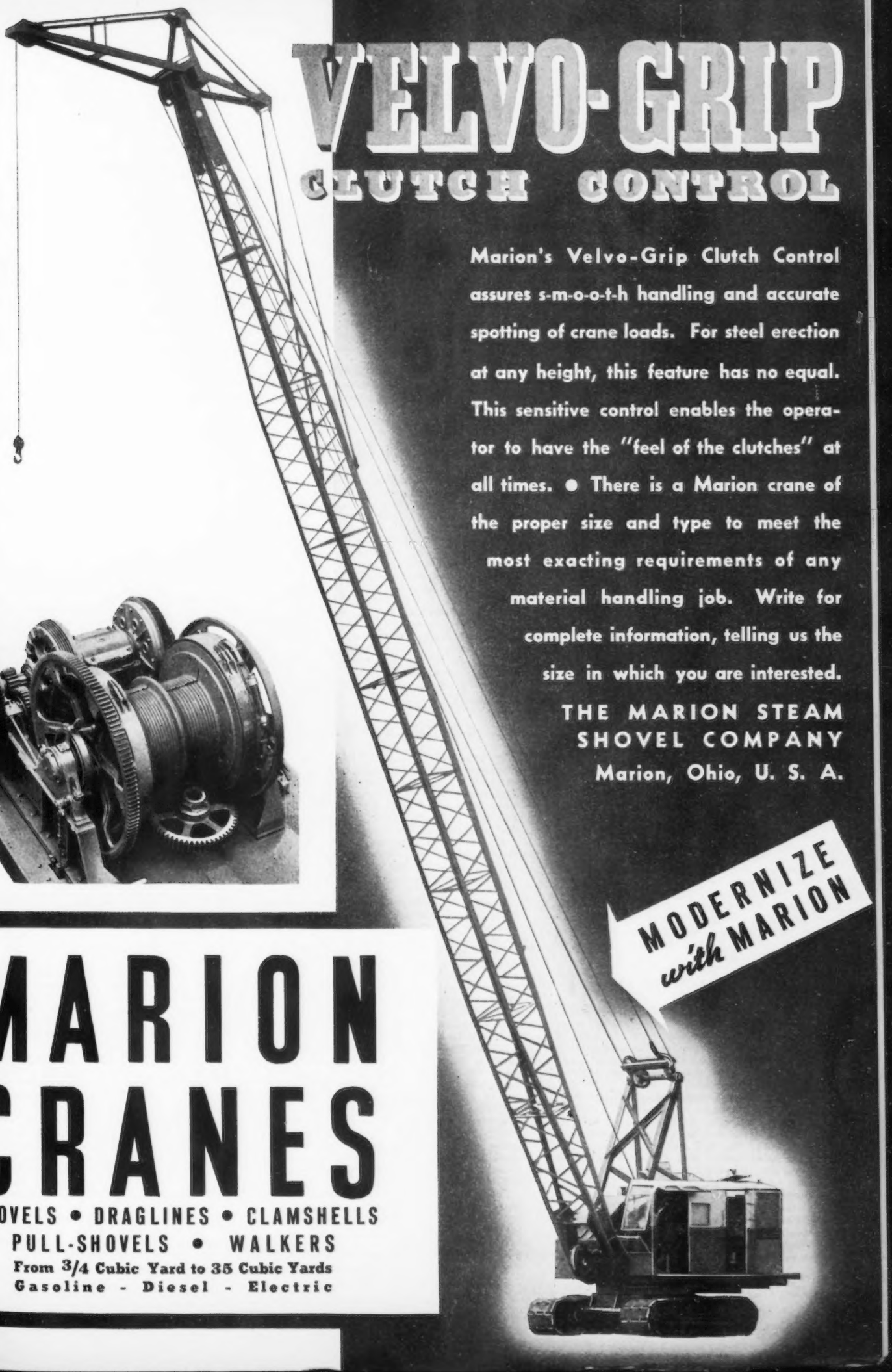
Frankfort Distilleries, Inc., Columbia Building, Louisville, has authorized expansion and improvements in branch plants at Baltimore and Dundalk, Md., including one and multi-story additions and equipment for distillery divisions, mechanical-bottling departments, storage and distribution. Cost close to $1,000,000 with machinery.

United States Engineer Office, Memphis, Tenn., asks bids until May 21 for pumping units for local flood protection works, consisting of vertical, axial flow, propeller-type drainage-water pumps, capacity for delivering 440 cu. ft. of water per sec., with electric motors and accessories.

City Council, Oxford, Miss., asks bids until May 7 for one 750-hp. diesel engine-generator and auxiliary equipment for municipal power plant.

Alabama Drydocks & Shipbuilding Co., Mobile, Ala., plans expansion and improvements in shipbuilding and repair plant on Pinto Island, including extensions in ways, shops and other structures. Cost close to $60,000 with equipment.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until



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May 7 for steel draft tube gate guides for Kentucky hydroelectric power plant.

SOUTHWEST

Southern Equipment Co., 5017 South Thirty-eighth Street, St. Louis, stainless steel equipment for hospitals, kitchens, etc., has let general contract to L. O. Stocker Co., Arcade Building, for two-story addition, 125 x 145 ft. Cost over $80,000 with equipment. R. V. McCann, 1047 Big Bend Boulevard, is architect.

Lehigh Portland Cement Co., Allentown, Pa., has let general contract to Chalmers & Borton Co., Nelson Building, Hutchinson, Kan., for addition to branch mill at Iola, Kan., for storage and distribution, consisting of main one-story unit, 45 x 217 ft., and 85 ft. high, 20 cylindrical tanks, headhouse, bins and other structures. Cost close to $150,000 with equipment.

City Council, St. Charles, Mo., plans new municipal power plant and electrical distribution system to cost about $600,000 with equipment. Special election has been called May 4 to approve bonds in that amount. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Union Electric Co. of Illinois, East St. Louis, Ill., has authorized plans for new steam-electric generating plant at Venice, Ill., installation to include two 40,000-kw. turbine-generator units and accessories, condensers, high-pressure boilers and auxiliary equipment, switchyard and line extensions. Cost over $4,000,000. Stone & Webster Engineering Corp., 49 Federal Street, Boston, Mass., is consulting engineer.

Container Corp. of America, Inc., 111 West Washington Street, Chicago, corrugated paper boxes and containers, has leased more than two floors in west wing of building of General Motors Corp., West Seventh Street, Fort Worth, Tex., for new branch plant. Cost about $200,000 with machinery.

Houston Oil Field Material Co., 1524 Maury Street, Houston, Tex., oil well equipment and supplies, is erecting one-story addition, 100 x 150 ft., for storage and distribution, for which general contract recently was let to Benson-Marxson Co., 2006 West Alabama Street. Cost over $50,000 with equipment. Moore & Lloyd, last noted address, are architects.

WESTERN PA. DIST.

Pennsylvania Edison Co., Altoona, Pa., has authorized fund of about $1,400,000 for expansion and improvements in properties, including power plants, transmission and distributing lines, power substations, switching stations and other structures.

Vesta Coal Co., Third and Ross Streets, Pittsburgh, subsidiary of Jones & Laughlin Steel Corp., plans new coal unloading dock on Monongahela River at Denbo, Pa., to include crane and boom, and other mechanical-handling facilities.

OHIO AND INDIANA

Packard Electric Division, General Motors Corp., Warren, Ohio, electric cables, wires, etc., plans two additions, about 75,000 sq. ft. of floor space, one-story unit for expansion in manufacturing division and two-story structure for general operations. Cost close to $185,000 with equipment.

Nehi Beverage Corp., Terre Haute, Ind., has leased two-story building, 120 x 126 ft., for new mechanical-bottling, storage and distributing plant to be erected by Combined Properties, Inc., 918 East Court Street, Cincinnati, at Gilbert and Chapel Streets, last noted city, for which general contract has just been let to Hubbell Engineering Co., 918 East Court Street. Cost over $65,000 with machinery.

Procter & Gamble Co., Gwynne Building, Cincinnati, has let general contract to H. K. Ferguson Co., Hanna Building, Cleveland, for seven-story and basement unit, 120 x 300 ft., for soap and soap products manufacture, adjoining edible oil plant at Dallas, Tex. Also for addition to power house, to include turbine-generator unit, high-pressure boilers and accessory equipment. Cost over $500,000 with equipment. Henry Manley, 655 Fifth Avenue, New York, is architect and engineer.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until May 6 for one ⅝-cu. yd. full-revolving, crawler-type shovel, diesel-powered (Circular 1459); until May 7, 150 to 2000 oxygen type regulators (Circular 1425), short fork turnbuckle assemblies (Circular 1428), brake assemblies and wheel assemblies (Circular 1418); until May 8, one three-unit type motor-generator set (Circular 1422), 650 engine cowling flap support suspension bracket assemblies, 550 engine cowling flap support ring suspension lugs (Circular 1431); until May 10, for 9000 lb. of brass wire (Circular 1444), bolt snaps, flare rack cable snaps and swivel snaps (Circular 1438).

Watters & Portman Wheel Co., Kendallville, Ind., vehicle wheels, etc., plans one-story addition, 75 x 100 ft. Cost close to $40,000 with equipment.

MICHIGAN DISTRICT

United Stove Co., Ypsilanti, Mich., cooking and heating oil stoves, parts, etc., has let general contract to Austin Co., Cleveland, for one-story addition. Cost about $75,000 with equipment.

Detroit Soda Products Co., 35 Perry Street, Wyandotte, Mich., washing sodas, has let general contract to Bennage & Kinstrie Co., 4612 Woodward Avenue, Detroit, for two-story addition. Cost close to $60,000 with equipment. H. T. Millar, 14827 East Jefferson Avenue, Detroit, is architect.

Ann Arbor Railroad Co., Ann Arbor, Mich., will begin work this month on razing old engine house at Owosso, Mich., to make way for new one-story engine house with shop facilities. Cost about $70,000 with equipment. Victor Parvin is general superintendent.

MIDDLE WEST

International Harvester Co., 180 North Michigan Avenue, Chicago, has let general contract to Tunnicliff Construction Co., 105 Fillmore Street, Davenport, Iowa, for one-story addition to branch plant at East Moline, Ill., 390 x 770 ft. Cost close to $1,000,000 with machinery.

F. J. Littell Machine Co., 4127 North Ravenswood Avenue, Chicago, has purchased one and two-story building, 85 x 164 ft., at 4115-21 North Ravenswood Avenue, for expansion.

Commanding Officer, Ordnance Department, Rock Island Arsenal, Rock Island, Ill., asks bids until May 6 for thread gages, plugs and rings (Circular 862).

Coca-Cola Bottling Co., 2035 University Avenue, S. E., Minneapolis, Minn., will take bids on general contract early in June for one and two-story mechanical-bottling, storage and distributing plant at St. Paul, Minn., with garage and service unit. Cost about $140,000 with equipment. E. H. Schmidt & Co., Mankato, Minn., are architects.

Rheem Mfg. Co., 3425 South Kedzie Avenue, Chicago, steel barrels, drums, etc., has filed plans for one-story addition, 102 x 300 ft., for which general contract has been let to W. P. Rudeberg, 160 North LaSalle Street. Cost about $60,000 with equipment.

Electric and Water Department, Marshfield, Wis., has authorized plans for municipal power plant, 42 x 100 ft., installation to include turbine unit and auxiliary equipment. Helmick, Edeskuty & Lutz, Essex Building, Minneapolis, Minn., are consulting engineers.

Constructing Quartermaster, Ordnance Department, Savanna Ordnance Depot, Savanna, Ill., asks bids until May 7 for one ditching machine (Circular 6579-33).

District Quartermaster, Sparta CCC District, Sparta, Wis., asks bids until May 8 for malleable iron pipe fittings, cast iron pipe fittings, valves, unions, septic tanks and other equipment (Circular 5605-114).

PACIFIC COAST

Pacific Aviation, Inc., 185 North Hawthorne Boulevard, Hawthorne, Los Angeles, aircraft and parts, plans one-story addition, 130 x 270 ft., for which bids will be asked soon on general contract. Cost close to $90,000 with equipment. Gerald Marsac, 8576 Wilshire Boulevard, Beverly Hills, Cal., is engineer.

Public Works Officer, Navy Yard, Bremerton, Wash., asks bids until May 15 for boiler plant equipment for naval air station, Tongue Point, Ore., including boiler units and accessories, reinforced-concrete stack, steam and electric distributing systems, etc. (Specifications 9484).

Chemurgic Corp., Richmond, Cal., chemical products, has let general contract to W. J. Krause, 1310 Marin Avenue, Berkeley, Cal., for one-story building for a machine shop and for equipment storage and distribution. Cost close to $50,000. E. T. Spencer, 369 Pine Street, San Francisco, is architect.

National Technical Laboratories, Inc., Mission Street, South Pasadena, Cal., manufacturer of laboratory instruments and other precision equipment and parts, has let general contract to C. L. Peck, 354 South Spring Street, Los Angeles, for two-story addition. Cost close to $50,000 with equipment. Ted R. Cooper Co., 1031 South Broadway, Los Angeles, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 7 for one planer and jointer, saw table, band-saw (Schedule 1411), two milling machines (Schedule 1417); until May 10, plate-bending machine and spare parts (Schedule 1444), multiple spindle drill (Schedule 1430), bench milling machine (Schedule 1438), all motor-driven, for Mare Island Navy Yard; two radial drills (Schedule 1423), one electric automatic feed printing press (Schedule 1437) for Puget Sound yard; until May 14, motor-driven hydraulic pipe-bending machine (Schedule 1461) for San Diego Naval Air Station.

Anderson Die Casting & Engineering Co., 217 East Seventeenth Street, Los Angeles, plans new one and two-story plant on East Sixtieth Street, about 21,000 sq. ft. of floor space. Cost close to $40,000 with equipment. Gerald Marsac, 8576 Wilshire Boulevard, Beverly Hills, Cal., is architect.

CANADA

International Nickel Co., 67 Wall Street, New York, has authorized appropriation of about $8,325,000 for expansion and improvement in properties at Copper Cliff, Ont., primarily for treatment of low-grade ores, including concentrator, smelting plant and auxiliary units.

De Haviland Aircraft of Canada, Ltd., Sheppard Avenue, North York Township, Ont., will build addition to assembly shop for which bids are being received by Deputy Minister, G. K. Shiels, Department of Munitions and Supply, Ottawa. D. Shepherd, 1244 Dufferin Street, Toronto, is engineer.

Department of Munitions and Supply, Ottawa, plans to spend $500,000 on improvement to Uplands Field airport, including construction of five hangars, for British Commonwealth Air Training Plan.

Public Utilities Commission, L. S. Connor, superintendent, Thorold, Ont., will close bids May 4 for 1500 gal. centrifugal pump.

Ford Motor Co. of Canada, Ltd., Windsor, Ont., has awarded contract to Hein Construction Co., 172 Aylmer Avenue, and has placed other sub-trades for $54,000 addition to plant.

Prince George, B. C., A. M. Paterson, mayor, will double capacity of electric power plant at cost of $30,000. Equipment to be purchased includes 375-hp. diesel engine connected to 250-kw. generator.